UNISYS

CTOS®
B39 Workstations
Hardware Installation Guide

Relative to workstations with B39-1, B39-2, B39-3, B39-4, B39-5, B39-6, B39-7, B39-A, or B39-B processor units

Priced Item

January 1992

Printed in U S America
4358 6411-000

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About This Guide

The *CTOS® B39 Workstations Hardware Installation Guide* provides installation instructions for the B39 workstation family. The B39 family includes workstations equipped with the following processor units:

- B39-1, B39-2, B39-3, B39-4, B39-5, B39-6, or B39-7
- B39-A or B39-B

To help you with your installation, the guide also summarizes the highlights of workstation configuration and installation planning.

Scope

The *Installation Guide* is designed as a hardware reference and, consequently, focuses on hardware oriented topics. For example, the guide tells you how to connect modules, monitors, printers, and other peripherals to your processor unit. The guide also explains how to start your workstation, insert floppy disks, and so forth.

Although the guide discusses how to arrange the hardware, it does not provide details on the equipment your workstation supports, how to plan the workstation, or how to keep the workstation operating efficiently. To find out more about these subjects, read the following publications:

- *CTOS Workstations Planning and Owner's Maintenance Guide*
- *CTOS Workstations Hardware Compatibility Matrix*

Also, the guide does not address such issues as software installation, equipment testing, cluster planning and cabling, or network cabling. For information on these topics, refer to the following documents:

- *CTOS System Administration Guide*
- *CTOS Cluster and Network Hardware Installation Guide*
- *CTOS System Software Installation Planning Guide*

The *Installation Guide* assumes that you know how to insert media. If you are not certain, see the *CTOS Media User's Guide*.

Who Should Use This Guide

Anyone installing a B39-based workstation should read this guide. Whether you are installing a workstation for the first time or the twentieth time, you will find the guide a valuable tool. You are not expected to be an expert, but you should be able to handle common tools like screwdrivers. You should also be familiar with the layout of the installation site.

How to Use This Guide

Use this guide as a hands-on procedural reference while you perform your installation. Keep the *Installation Guide* at your side as you unpack and assemble your workstation. The guide assumes that you have already performed the following steps:

- Planned your hardware configuration
- Made sure the installation site meets workstation requirements
- Planned your cluster (if appropriate)
- Planned your network (if appropriate)
- Performed an inventory of the shipping cartons to make sure that all of your equipment arrived
- Moved all of your equipment to the installation site

If you have not completed these steps, take a moment to do so before you go any further. For a broader understanding of configuration and site planning, read the other publications that came with your equipment.

Some of your equipment arrives with a document called an installation sheet. This sheet provides visual overviews of the installation process for the device in question. Those of you who are new to the CTOS world are strongly encouraged to work from the *Installation Guide* rather than the sheets. If you have performed CTOS equipment installations in the past, you may have enough experience to install a typical workstation from the sheets alone.

Organization

The *Installation Guide* is organized as follows:

Section 1. Before You Start

This section provides a summary of B39 workstation configuration planning, discusses the basic rules of workstation placement, and covers important safety guidelines. Section 1 is a refresher only; do not use it as an in-depth planning tool. For details on configuration and site planning, see the *CTOS Workstations Planning and Owner's Maintenance Guide.*

Section 2. B39 Workstation Installation

This section outlines the installation procedures for your workstation. Section 2 tells you how to install your processor unit, modules (X-bus™ and SCSI), peripherals, and power supplies.

Section 3. B39 Workstation Startup

This section describes workstation startup procedures. Section 3 includes material on workstation controls and indicators, powering up the workstation, and connecting a workstation to a cluster or network.

Section 4. B39 Workstation Troubleshooting

This section discusses some of the problems you may experience with a newly installed workstation. Section 4 emphasizes straightforward, easily implemented solutions. This section also tells you about system status codes.

Common Terms

If you are new to CTOS systems, you may be unfamiliar with certain terms used in the *Installation Guide*. To help you get acquainted, the following text defines some of these terms. Please refer to the glossary at the end of the guide if you have questions about terms that do not appear on this list.

Hardware — Hardware is the name given to a piece of computer equipment such as a processor unit, monitor, module, or keyboard.

Software	Software is the name given to a program or group of programs that control the operation of your hardware.
Workstation	A workstation is a group of hardware devices combined to form a complete computer system. Workstations must include a processor unit, monitor, and keyboard; workstations may also feature a wide variety of special-purpose modules and peripherals.
Processor unit	A processor unit is the device responsible for the basic control functions performed by your workstation. It accepts the data you enter at the keyboard and executes your commands.
Module	A module is a device that expands the capabilities or control functions of your processor unit. Modules are physically latched to your processor unit or to another module. Among the different types of modules are disk drives, tape drives, and graphics modules.
Peripheral	A peripheral is a device that supports the workstation by allowing you to communicate with your equipment, receive printouts, and so forth. Peripherals are connected to your processor unit or modules by cables; they are not physically latched to your workstation. Members of the peripheral family include printers, monitors, and modems.
Bus	A bus is the circuitry that links individual devices together so that they can communicate with one another. The CTOS environment features several types of buses. Prominent among these are the X-Bus and the SCSI (Small Computer System Interface) bus. Your workstation may have one or both of these buses.

Conventions

To simplify discussion, the *Installation Guide* uses the following conventions:

- The term "B2X/B3X" refers to workstations that utilize B28, B38, B39, LCW, EXP, and GXL-type processor units.
- The terms "system" and "workstation" are used interchangeably.
- The terms "compact disc," "optical disc," and "CD-ROM disc" are used interchangeably.
- The terms "diskette" and "floppy disk" are used interchangeably.
- Unless otherwise stated, treat all directional references as if you were looking at the front of the equipment. In other words, "left" means "toward the left side as viewed from the front of the module."

The *Installation Guide* also introduces several new terms. These terms replace older terms formerly used in Unisys documentation. Here is a table listing each new term and the term(s) it replaces.

New Term	Old Term
Server	Master
Processor Unit	Processor
X-Bus Card	Option Board Option Card Internal Option Card
Memory Expansion	Memory Expansion Cartridge Memory Module Memory Expansion Module
Module	Expansion Module
Tape Module	Tape Streamer

Related Product Information

Unisys publishes a variety of manuals designed to familiarize you with your workstation and some of the situations you may encounter when operating your workstation. As you plan your documentation library, you may want to review the following volumes. Some of these books ship with your workstation or software. You can order others by calling your sales representative.

Installing Your Workstation

To help you install your equipment, we provide a number of documents that focus on various issues related to installation. Here is a brief discussion of these documents:

CTOS Workstations Planning and Owner's Maintenance Guide

This document covers a wide range of equipment planning issues and tells you how to maintain your workstation. This information is crucial to the installation process. If you have never installed a workstation, review this document **before** you start installing your equipment. Those who are experienced with B39 workstations will find this guide valuable for specialized questions.

CTOS Workstations Hardware Compatibility Matrix

This document indicates which modules and peripherals your processor unit supports.

Installation Sheets

These documents are pictorial representations of how you install various pieces of equipment. If an installation sheet is available for a particular device, it ships in the carton containing that device.

BTOS™ Hardware Installation Guide

This document covers the installation procedures for early B2X/B3X workstations. This guide can prove helpful if your workstation includes any equipment that has a B27 prefix. Remember that instructions in the *CTOS B39 Workstations Hardware Installation Guide* take precedence over instructions in the *BTOS Hardware Installation Guide* if there is a conflict.

CTOS Cluster and Network Hardware Installation Guide

This document is a planning aid that discusses such subjects as cable routing for clusters and local area networks, cable types, and connection methods.

CTOS System Software Installation Planning Guide

This document tells you how to plan your operating system installation. The guide provides an overview of the installation process and a detailed explanation of the choices you need to make as you install the operating system.

Operating Your Workstation

Once you begin to operate your workstation, you will probably need documents that cover specific program applications, diagnostic testing, system utilities, and so forth. Here is a list of books that you may find handy:

CTOS Media User's Guide

This guide tells you how to insert, remove, and store your media.

CTOS Executive User's Guide

This document introduces you to the most commonly used Executive features and utilities. Topics include copying files, completing file backups, creating macro commands, and maintaining a file system.

CTOS System Administration Guide

This document defines the administrative aspects of your system software. The *System Administration Guide* furnishes material on setting up various types of operating systems, implementing application software, and installing peripherals.

CTOS Generic Print System™ Administration Guide

This document defines the administrative aspects of the Generic Print System (GPS), a software tool that manages printers. In addition to information on GPS, this guide covers printer installation and the basics of troubleshooting.

CTOS Status Codes Reference Manual

This two-volume set provides a comprehensive list of status codes generated by your workstation, including bootstrap ROM status codes.

CTOS Visinostics Operations Guide

This document discusses system diagnostic tests and customizing these tests for your equipment.

Other Publications

As your level of experience increases, you may want to expand your library by adding manuals that pertain to specific applications, special-interest topics, or equipment used in your workstation. Because the selection of available documents is a large one, it cannot be included in this text. For further information, ask your sales representative.

Section 1
Before You Start

This section covers some of the topics you should think about before you start your installation. These topics include hardware support, device configuration, power planning, physical placement, and safety. Section 1 summarizes the rules that govern basic workstation planning; it does not provide details on clusters or networks.

Treat Section 1 as a refresher rather than a complete discussion. For more detailed coverage of the topics in this section and a review of how to set up your cluster or network, refer to the other publications that arrived with your equipment. Here is an overview of the subjects you will read about in Section 1.

- Special notes for new users, cluster users, and network users
- Configuring your processor unit
  - X-Bus cards
  - Memory expansions
  - Modules
- Configuring your module string
  - Workstation buses
  - Module combinations
  - Module placement
  - Sample installation order
- Configuring your peripherals
- Configuring your power supplies
- Physical placement and your workstation environment
- Safety and equipment handling

For New Users, Cluster Users, and Network Users

If you have not yet read your *CTOS Workstations Planning and Owner's Maintenance Guide*, do not go any further without reviewing Sections 1 through 5 of that guide. These sections introduce many planning concepts critical to the success of your installation. Unless you are familiar with these concepts, you can make configuration errors that could result in poor equipment performance. Servers and cluster workstations are particularly sensitive to configuration factors.

Configuring Your Processor Unit

You can configure one processor unit per workstation. Your processor unit supports a wide variety of attachments. Among these are X-Bus cards, memory expansions, and modules. Here are some points to keep in mind as you plan your configuration.

Note: *You cannot install X-Bus cards or memory expansions by yourself. If you configure these attachments, you* ***must*** *ask your service representative to perform the installation for you.*

X-Bus Cards

- You can configure the following X-Bus cards for the B39-1, B39-2, B39-3, B39-4, B39-5, B39-6, and B39-7:
  - B25-DN1
  - B25-VG1 (with or without the B25-VGM)
  - B25-VG3
  - B39-EV1
- If you have your service representative remove the B39-EV1 X-Bus card shipped in the processor unit, you can configure the following X-Bus cards for the B39-A and B39-B:
  - B25-DN1 (you can configure this X-Bus card with the B39-EV1 in place)
  - B25-VG1 (with or without the B25-VGM)
  - B25-VG3

- If you have a B25-CA1, B25-GS1, B25-VDM, B25-VDC, SG-120-D, VGA-200-MON, VGA-931-VDM, or VGA monitor, you must configure one of the following X-Bus cards:
  - B25-VG1 (with or without the B25-VGM)
  - B25-VG3

Note: *As an alternative, you can configure a B25-VG2 or B25-VG4 graphics module.*

Base Memory and Memory Expansions

- Your processor unit is equipped with 4 megabytes of base memory.
- You can expand your base memory by adding 4-megabyte memory expansions (B39-4MBs) to your processor unit. Each memory expansion is made up of four 1-megabyte SIMMs.
- You can configure up to five memory expansions, yielding up to 20 megabytes of extra memory (system total: 24 megabytes).

Modules

- You cannot configure B25-AG2, B25-GPP, B25-GRA, or B25-GRE graphics modules for B39 processor units.
- For processor units that do not have a B39-EV1, B25-VG1, or B25-VG3 X-Bus card, you **must** configure a B25-VG2 or B25-VG4 graphics module.
- You cannot configure the B25-TEM teller extension module for B39 processor units.
- In the rare event that you are installing the B25-FXC or any module with a B27 prefix, see the *BTOS Hardware Installation Guide.*

Configuring Your Modules

Your modules attach directly to your processor unit. They are arranged in a row that extends from the right side of the processor unit. As you attach your modules one to the next, you develop a grouping known as a *module string.*

To guide you through the planning process, the following paragraphs discuss some of the rules that govern module placement. For the most part, these rules are absolute; if you do not follow them, your workstation will not function correctly. In some instances, the rules can be regarded as recommendations instead of restrictions. The discussion will tell you whenever this is the case.

Workstation Buses

Your workstation can include two types of buses: the X-Bus and the SCSI bus. Each of these buses has a unique set of modules and a unique set of rules that determines how many modules you can configure for the bus. As you plan your module string, observe these restrictions:

X-Bus Modules Only

- You can configure up to eight X-Bus devices, whether modules or X-Bus cards. Regardless of how many X-Bus devices you have, you must observe the X-Bus length constraints (see next item).
- The combined length of an X-Bus string cannot exceed 24 inches (61 cm), as shown in Figure 1–1. Here are some pointers on calculating X-Bus length:
  - Looking at the front of your equipment, the length of the X-Bus string is measured from the right side of the processor unit to the right side of the last X-Bus module.
  - Calculate the length of your X-Bus string by noting the width of each module and adding all the widths together. Table 1–1 provides you with the width of each X-Bus module.

SCSI Modules Only

- If your SCSI string lies immediately to the right of your processor unit and you have no X-Bus modules, you can configure up to six SCSI expansion modules for the module string (see Figure 1–1).
- If your SCSI string lies immediately to the right of your X-Bus string, you must install a SCSI upgrade module at the beginning of the SCSI string. You can then configure up to six SCSI expansion modules for the module string (see Figure 1–2).

  Note: *You cannot configure more than one SCSI upgrade for your SCSI string.*

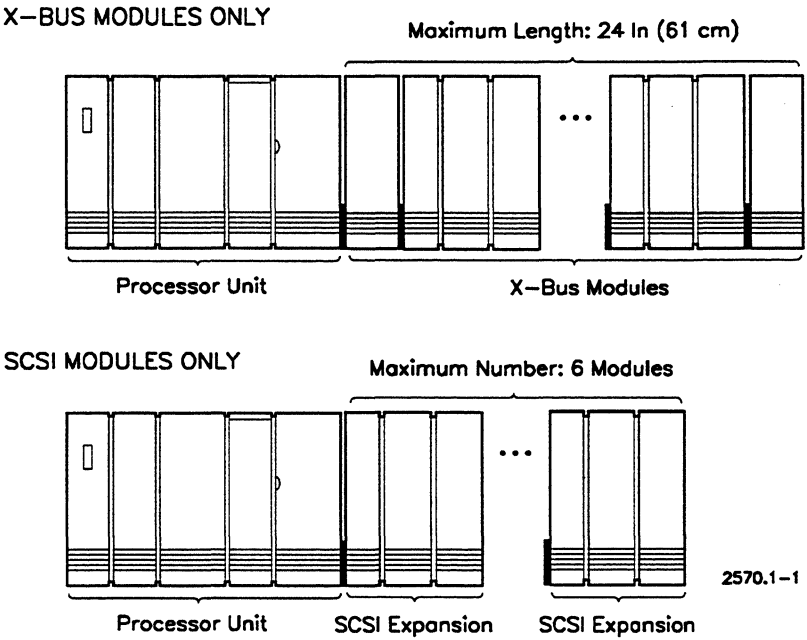


Figure 1–1. X-Bus and SCSI Module Strings

Table 1–1. X-Bus Module Width

Device Type	Device *	Width
Graphics Modules	All	2.7 in. (6.9 cm)
Disk Modules	MX3, MX4	2.7 in. (6.9 cm)
	All Others	5.8 in. (14.7 cm)
Tape Modules	TS	5.8 in. (14.7 cm)
Communications Modules	DCX, DN2	2.7 in. (6.9 cm)
	EN3, ID2, IDS, TR2	3.9 in. (9.9 cm)
Special-Purpose Modules	1PC, PEM, TEL	2.7 in. (6.9 cm)

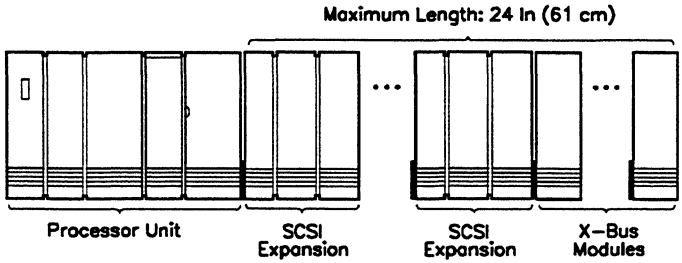
* The B25 prefix has been omitted from all module titles for clarity.

X-Bus and SCSI Bus Combinations

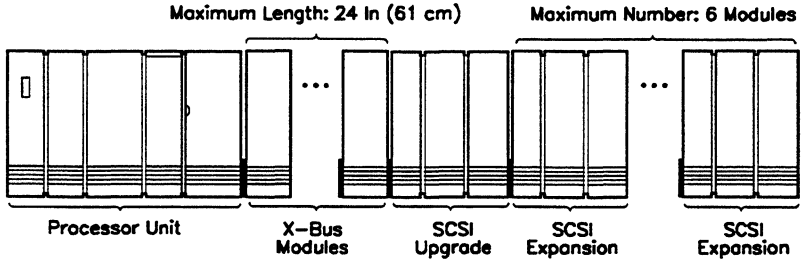
As mentioned, your workstation can include both an X-Bus and a SCSI bus. In fact, because B39 processor units incorporate a SCSI controller, B39 workstations can have two SCSI buses. When you have an X-Bus and SCSI bus combination, you need to observe the following rules:

- You can configure both X-Bus and SCSI modules as long as you group the X-Bus modules together. You cannot intersperse the two types of modules.
- If you have a group of SCSI modules followed by a group of X-Bus modules, here are your guidelines:
  - You cannot configure a SCSI upgrade for the string; upgrade functions are already incorporated in the processor unit cabinet.
  - You can configure up to three SCSI expansions. These expansions must be attached to the immediate right of the processor unit (see Figure 1–2).
  - Your SCSI expansions are followed by your X-Bus string.
  - The combined length of the SCSI/X-Bus string cannot exceed 24 in. (61 cm). See Figure 1–2 for an example.

SCSI AND X–BUS MODULES



X–BUS AND SCSI MODULES



X–BUS AND SCSI MODULES (Two SCSI Groups)

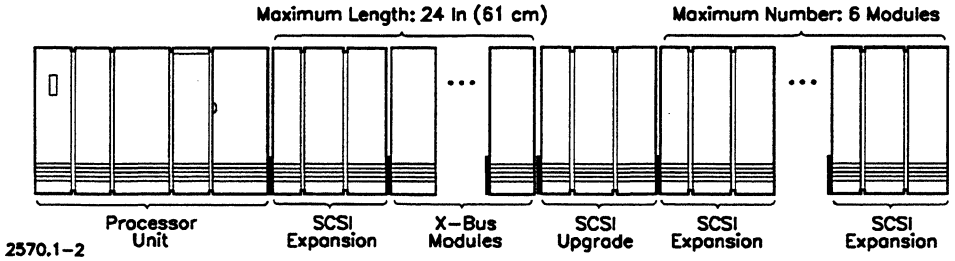


Figure 1–2. X-Bus and SCSI Bus Combinations

- If you have a group of X-Bus modules followed by a group of SCSI modules, here are your guidelines:
  - The combined length of the X-Bus module string cannot exceed 24 inches (61 cm).
  - You must configure a SCSI upgrade for your SCSI string. You place the SCSI upgrade at the end of the X-Bus string (see Figure 1–2).
  - You can configure a maximum of six SCSI expansions for the SCSI bus. You attach this group of modules to the right side of the SCSI upgrade.
- If you have **two** groups of SCSI modules and one group of X-Bus modules, you attach the first SCSI group to the right side of your processor unit. This group is followed by the X-Bus modules which, in turn, are followed by the second SCSI group. When you configure your module string, observe these guidelines:
  - **First SCSI Group** – You can configure up to three SCSI expansions immediately to the right of your processor unit. Do not configure a SCSI upgrade for this group of modules.
  - **X-Bus Group** – Your SCSI expansions are followed by your X-Bus string. The combined length of the first SCSI group and the X-Bus string cannot exceed 24 inches (61 cm). See Figure 1–2 for an example.
  - **Second SCSI Group** – Your X-Bus string is followed by your second SCSI group. For this group, you place a SCSI upgrade at the end of the X-Bus string. You can then attach a maximum of six SCSI expansions to the right of the upgrade.

    Note: *In some configurations, the first SCSI group is directly followed a SCSI upgrade and the second group of SCSI expansions. In this case, you cannot configure more than four SCSI expansions in the first SCSI group.*

Module Combinations

You can combine your modules in many different ways. However, there are rules that govern the number of similar modules you can configure for each workstation. As you arrange your equipment, make sure that your configuration adheres to the following guidelines:

- You can install only one graphics controller per workstation. Remember that graphics controllers for B39 workstations come in two forms: X-Bus cards and modules. If your processor unit already has an X-Bus card graphics controller, you cannot add a graphics module.
- You must install one X-Bus upgrade module per X-Bus expansion.
- You can install up to six SCSI expansions for your SCSI upgrade.
- You can install up to three floppy drives per workstation; be sure to count any single floppy module as two floppy drives. If you customize the operating system, you can add more floppy drives.
- You can install up to eleven hard disk modules (SCSI and X-Bus) per workstation.
- You can install up to four SCSI expansions that do not contain magnetic disks. Equipment in this category includes CD-ROM expansions and SCSI tape modules.
- You can install up to four tape modules (SCSI and X-Bus) per workstation. Only one of these can be an X-Bus tape module.
- You can install up to four Mode 3 modules per workstation. Here is a list of Mode 3 modules:
  - X-Bus tape modules (B25-TS)
  - LAN modules (B25-TR2 or B25-EN3)
  - Intelligent data communications modules (B25-IDS and B25-ID2)
  - Integrated services digital network (ISDN) modules (B25-DN2)
  - Voice Processor modules (B25-TEL)
  - Peripheral extension modules (B25-PEM)

- You can install up to two four-port data communications modules (B25-DCX) per workstation.
- Although B39 processor units already include this function, you can install one IBM® PC Emulator™ module (B25-1PC) per workstation.
- You can install only one Voice Processor™ module (B25-TEL) per workstation.
- The following items are recommendations rather than rules. Most configurations work best if you observe these recommendations. However, depending on your software and applications, you may find that a different arrangement is more efficient.
  - You can install up to two intelligent data communications modules (B25-IDS and B25-ID2) per workstation.
  - You can install both token ring (B25-TR2) and Ethernet (B25-EN3) modules for your workstation. However, you generally should not have more than one of either type.
- In the rare event that you are installing the B25-FXC or any module with a B27 prefix, see the *BTOS Hardware Installation Guide.*

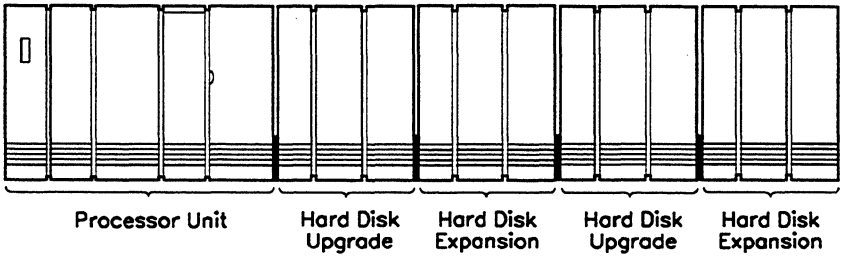
Module Placement

Now that you know how many modules you can configure, you need to think about how to arrange them. The order of your modules is critical to the success of your installation. Some of the factors you should consider as you plan your string are physical convenience and workstation performance. For example, you may want to situate a tape module so that it is within easy reach. Also, if you have different types of LAN modules, workstation performance may be affected by where they lie in relation to each other.

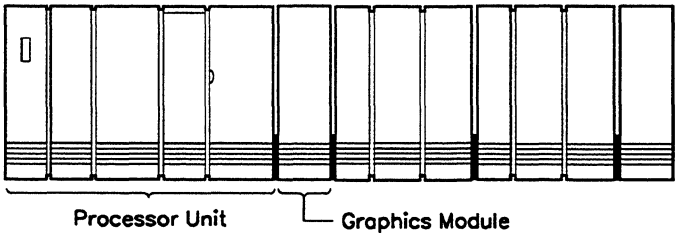
Although you have a great deal of freedom in how you arrange your modules, you should observe the following rules as you plan your configuration. Figure 1–3 illustrates some of the principles discussed below.

- The processor unit is always the leftmost device in the string.
- If you have a graphics module, it must be the first module in the X-Bus. For configurations where SCSI expansions are directly attached to the processor unit, place the graphics module immediately after these expansions.

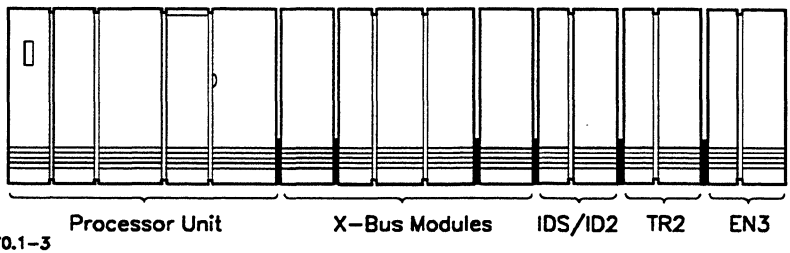
PLACEMENT OF X–BUS UPGRADES AND EXPANSIONS



PLACEMENT OF A GRAPHICS MODULE



PLACEMENT OF IDS/ID2, TR2, AND EN3 MODULES



2570.1–3

Figure 1–3. Module Placement

- If you have an X-Bus expansion module, always place an X-Bus upgrade module to the immediate left of the expansion module. Each X-Bus expansion requires a separate X-Bus upgrade.
- For SCSI strings that follow the X-Bus, a SCSI upgrade always lies to the left of the SCSI expansion group.
- The B25-1PC, B25-PEM, B25-TEL, and all X-Bus tape or disk modules lie to the left of the B25-IDS and B25-ID2 intelligent data communications modules.
- Do not place any X-Bus modules to the right of the LAN modules (B25-TR2 and B25-EN3) or the SCSI upgrade modules (B25-CDC, B25-MS5, B25-MS6, B25-MS7, B25-MS8, B25-MS9, and B25-MSA).
- You must place at least one module between the B25-DCX and your processor unit.
- If you place a B25-DCX to the left of a module that includes a rear connector extension panel (for example, B25-EN3s and B25-ID2s), use right-angle connectors for the B25-DCX cables.
- The following items are recommendations rather than rules. Most configurations work best if you observe these recommendations. However, depending on your software and applications, you may find that a different arrangement is more efficient.
  - The B25-ID2 and B25-IDS should lie to the left of any B25-TR2 and B25-EN3 modules. If the B25-IDS/ID2 is not the last module in the X-Bus, be sure to use right-angle connectors on all B25-IDS/ID2 cables.
  - If you have both a B25-TR2 and a B25-EN3, the B25-TR2 should lie to the left of the B25-EN3.
- In the rare event that you are installing the B25-FXC or any module with a B27 prefix, see the *BTOS Hardware Installation Guide*.

Installation Order

Before you install your equipment, take a moment to arrange your module string on paper. Put the processor unit and modules in the order you chose for your configuration plan. Remember, a well planned installation is a smoother and quicker installation.

Table 1–2 provides an example of the installation order for B39-based workstations. Do not worry if your configuration does not exactly match the one in the table. Your workstation uses only a portion of the modules shown in the table. Also, some of the listed modules can be placed in different positions. If you think you have configured your equipment incorrectly, review the "Configuration" section in the *CTOS Workstations Planning and Owner's Maintenance Guide.*

To help you with this part of the planning process, Figure 1–4 provides a module configuration form. To use this form, take an informal inventory of your equipment. Next, fill in the blank modules according to Table 1–2 and the guidelines discussed in the previous paragraphs.

Table 1–2. Sample Installation Order

Bus	String Position	Device
Both Buses	1	B39 Processor Unit
SCSI Bus *	2	SCSI Hard Disk Expansion Module
	3	SCSI QIC or DDS Tape Expansion Module
	4	SCSI CD-ROM Expansion Module
X-Bus	5	Graphics Module
	6	Voice Processor Module
	7	Peripheral Extension Module
	8	ISDN Module
	9	Hard Disk or Hard/Floppy Disk Upgrade Module
	10	Hard Disk Expansion Module
	11	Single, Dual, or 3.5/5.25-inch Floppy Disk Module
	12	Tape Module
	13	Four-port Data Communications Module
	14	Intelligent Data Communications Module
	15	Token Ring LAN Module
	16	Ethernet LAN Module
SCSI Bus †	17	SCSI Hard Disk or CD-ROM Upgrade Module
	18	SCSI Hard Disk Expansion Module
	19	SCSI QIC Tape Expansion Module
	20	SCSI DDS Tape Expansion Module
	21	SCSI CD-ROM Expansion Module

* The X-Bus passes through these modules.

† If your configuration includes a B25-FXC module or any B27-prefix modules, see the *BTOS Hardware Installation Guide* for configuration restrictions.

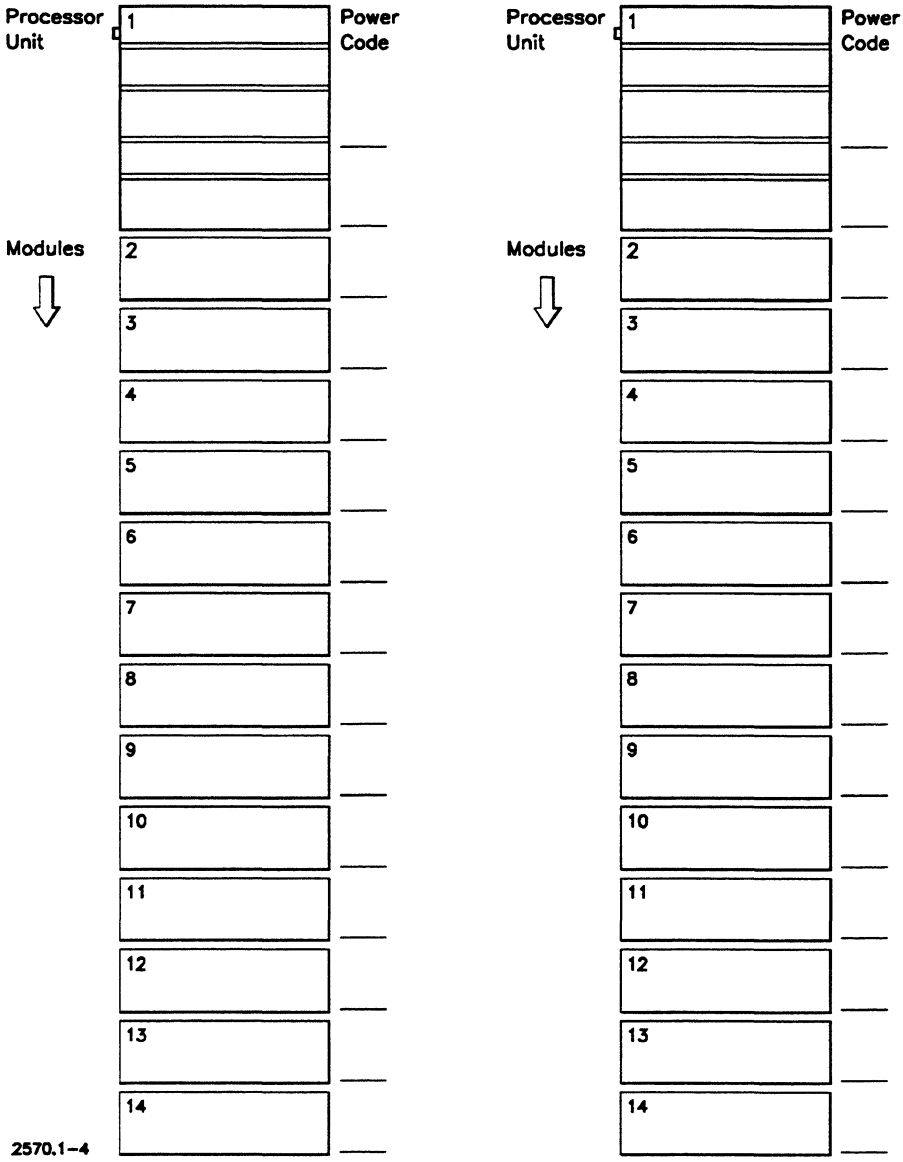


Figure 1–4. Workstation Configuration Form

Configuring Your Peripherals

Peripherals have relatively straightforward configurations. The next few paragraphs familiarize you with some of the issues you should consider.

All Peripherals

In configuring your peripherals, be aware of the following guidelines:

- **Placement** – You can attach your peripherals to your processor unit and module string or to your keyboard. Here are some pointers:
  - You can attach printers, financial equipment, and data communications devices to your processor unit. If your processor unit includes a graphics controller X-Bus card, you can also attach a monitor.
  - You can attach a monitor to your graphics module.
  - You can attach a keyboard to your monitor.
  - You can attach mice, graphics tablets, and magnetic card readers to your keyboard.
  - You can attach printers, data communications devices, and financial peripherals (magnetic card readers and PIN keypads) to B25-PEM modules.
  - You can attach printers, data communications devices, and certain financial peripherals to B25-DCX modules.
- **Number** – The number of peripherals you can attach depends on how many peripheral ports your workstation has. Observe these guidelines:
  - You can attach one monitor, two serial peripherals (printers, modems, and so forth), and one parallel peripheral (generally a printer) to your processor unit.
  - You can attach one monitor to your graphics module.

    Note: *Regardless of where you attach it, you can only configure* ***one*** *monitor per workstation.*

- You can attach one keyboard to your monitor.

  Note: *If you have a B25-CA1, B25-GS1, B25-VDM, B25-VDC, SG-120-D, VGA-200-MON, VGA-931-VDM, or VGA monitor, you attach the keyboard to the B25-VKA monitor adapter instead.*

- You can attach up to three peripherals to the B25-PEM module.
- You can attach up to four peripherals to the B25-DCX module; you can also attach this module to a wide area network (WAN).
- You can attach one peripheral to your keyboard.

Monitors

There are special rules associated with monitors. Here is a list:

- If you have a B39-1, B39-2, B39-3, B39-4, B39-5, B39-6, or B39-7 processor unit, you must configure a graphics module or a graphics controller X-Bus card for your workstation or you will not be able to attach a monitor.
- B39-A and B39-B processor units arrive with a B39-EV1 X-Bus card already installed. If you have one of these processor units, you must replace the B39-EV1 with a graphics module or one of the other graphics controller X-Bus cards if you want to attach the B25-CA1, B25-GS1, B25-VDM, B25-VDC, SG-120-D, VGA-200-MON, VGA-931-VDM, or VGA monitor.
- If you have a B25-VDM, B25-VDC, SG-120-D, VGA-200-MON, VGA-931-VDM, or VGA monitor, you need to install a B25-VKA monitor adapter. For the B25-VDM and B25-VDC, the monitor adapter is shipped with the monitor.

For more on peripherals, see the *CTOS Hardware Compatibility Matrix.* If you have a question about printers, refer instead to the *CTOS Generic Print System Administration Guide.*

Configuring Your Power Supplies

B39s incorporate an internal power supply that services the processor unit. If your monitor is directly connected to your processor unit (no graphics module), the internal power supply services the graphics controller X-Bus card and monitor as well.

Each module that you add to your workstation requires additional power, which is provided by your B25-PS or B25-PS1 power supplies. As you add modules to your workstation, you need to add power supplies to service the modules. You can approximate the number of power supplies your workstation will need by completing the following steps.

Note: *Some workstations require one extra power supply for the last module in the string. Whether or not you need an extra power supply depends on how your module string is configured. You will not determine the exact number of supplies until you install your workstation in Section 2.*

1. Look at the workstation configuration form you filled out (Figure 1–4).
2. Use the information in Table 1–3 to determine the power code for each of your modules. Add this information to the form.

   Note: *If your workstation includes a graphics module, add the power code for your monitor to the graphics module power code. When the monitor is connected to an X-Bus card instead of a graphics module, do* ***not*** *include the monitor power code in your calculations.*

3. Add the power codes together. Divide the sum by one of the numbers listed below.
   - For B25-PS power supplies, divide by 10.
   - For B25-PS1 power supplies, divide by 15.
   - For systems that include both power supplies, adjust your math accordingly.
4. If the result is a fractional number, round the number upward (in other words, round 2.3 upward to 3).
5. Use the rounded number as an approximation of how many supplies you need.

Table 1–3. Workstation Power Codes

Device Type	Device *	Power Code
Graphics Modules	All	2
Disk Modules	XS6	2
	M0, M1, MS5, MS6, MS9, XS7, XS8, XSA	3
	CX5, CX6, MF1, MS7, MS8, MSA, MX3, MX4, MX5, MX6	4
	M3, M4, M5, MC5, MC6, MU5	6
Tape Modules	DDS	2
	TS, TS2	5
Communications Modules	DCX	1
	DN2	2
	EN3, ID2, IDS, TR2	3
Special-Purpose Modules	TEL	1
	PEM	1.5
	CDX, 1PC	2
	CDC	3
Monitors	CA1, GS1	1
	D1, D2, D5, D6, PD7	3
	PD8	4.5

* The B25 prefix has been omitted from all module titles for clarity. If a device does not appear in this table, it has a power code of 0.

Where to Put Your Equipment

Where you put your workstation can affect how well it performs and how comfortably it serves you. For your equipment to function correctly, its immediate surroundings must comply with certain environmental and electrical specifications. If you choose a site that does not adhere to the following guidelines, your workstation may experience problems.

- Make sure that the room you choose complies with the thermal specifications listed in Appendix A of the *CTOS Workstations Planning and Owner's Maintenance Guide.*
- Make sure that the room you choose does not heat up past the thermal limits once you turn on all the equipment. Should you encounter this problem, you **must** turn up your air conditioning system so that the room stays within the specified temperature range. If you do not, your workstation can experience performance problems and reduced reliability.
- Disk and tape storage modules are sensitive to sudden temperature and humidity changes. If the room you select for your workstation undergoes rapid climate changes, you **must** adjust your climate controls to minimize these changes.
- Choose a desk or some other open surface as the location for your processor unit and modules. Whatever surface you select, **be sure** that it can support the combined weight of your processor unit, modules, and any other equipment it is commonly used for.

  Note: *If you plan to place your B39 processor unit and module strings on a shelf, be careful. Most shelves are not strong enough to support B39 configurations.*

- If you decide to stack your monitor on top of your processor unit and modules, ensure that your work surface can support the equipment.
- Do **not** place your workstation on the same surface as your printer or any other device that vibrates. Excessive vibration can damage high-performance hard disks and loosen workstation connections.
- Leave **at least** 4 inches (10.2 cm) of space behind the processor unit and module string. Make sure that this area is clear of debris (papers, pencils, and so forth). Ensure that nothing blocks the fan vents.

- Leave **at least** 3 inches (7.6 cm) of space in front of the processor unit and module string. Make sure that this area is clear of debris and that nothing blocks the air vents.
- Do **not** place objects (papers, books, and so forth) on top of your processor unit, modules, or monitor.
- **Never** put your workstation in a drawer. Do **not** place it on a shelf that restricts airflow. Do not place your workstation in a closed cabinet.
- If you place your workstation on a shelf, make sure to leave at least 6 inches (15.2 cm) of air space above the workstation to prevent overheating.
- Do not place the processor unit and modules in a location where they can collect dirt and debris (the floor, for example).
- **Never** place your equipment in a location that receives direct sunlight.
- Make sure that the room you choose has enough electrical outlets for your equipment. Overloading a single outlet can cause electrical problems.

Safety Precautions and Equipment Handling

To ensure hazard-free operation, your workstation meets all established safety codes. However, as with any electrical equipment, you should observe certain safety precautions and component handling guidelines. Here is a list of measures you should take.

Safety Precautions

The following safety precautions are designed to protect you and your co-workers. They also help prevent equipment damage.

- **Never** move processors or modules while they are turned on.
- Make **sure** your equipment is turned off if you are working with power supplies, changing modules, altering workstation connections, or moving your equipment. Also, make sure to unplug the processor unit and **both** ends of each power supply.

- Use two people to lift heavy equipment such as B39 processor units, monitors, and certain modules.
- Do not route cables across the floor in commonly traveled areas. You or your co-workers may trip.
- Do not lay equipment on the floor in commonly traveled areas. You or your co-workers may trip on it.

Equipment Handling

Because it is sensitive to mechanical stress and electrical conditions, computer equipment requires careful handling. Make sure you observe the following guidelines:

- Set your equipment down gently; do not drop it.
- **Never** pick up a module string once it has been connected.
- If you put your processor unit on a shelf, attach the modules while it is on the shelf. Do not attach the modules and then lift the string.
- Before you turn on your workstation, make sure that your hard disk drives are at room temperature. To test for temperature, lay your hand on each hard disk module. If it is cold to the touch, wait until it feels warm and then start your workstation.
- The first time you run any hard disk, turn on the workstation and let the disk spin for about 15 minutes before you use it.
- Before you move any hard disk module from one place to another, start the Executive and issue the Head Park command (see the *CTOS Executive Reference Manual*).
- If you unpack an X-Bus card or memory expansion before your service representative arrives to install it, do **not** remove it from its static shielding bag.

  Note: *All X-Bus card and memory expansion bags have a label that warns you about static sensitivity.*

Required Tools

To install your workstation, you need a small slot screwdriver for connecting cables and a pair of scissors for opening your shipping cartons. For certain connectors, you may also need a Phillips head screwdriver. Make sure to collect your tools before you start.

Where to Go From Here

At this point, you should have fully planned your configuration and collected all the shipping cartons for your workstation. Here is a list of things you have accomplished:

- You have planned your equipment configuration.
- You have estimated how many power supplies you will need.
- You have made sure that your installation site complies with all environmental requirements and that you have observed all rules of placement.
- You have studied all safety precautions.

If you have not completed these tasks, take some time to do so now. When you are ready, turn to Section 2 to start your installation.

Section 2
B39 Workstation Installation

Section 2 tells you how to install a basic B39 workstation. Keep this section at your side as you work with your equipment. Before you start, make sure you have carefully considered the planning criteria discussed in Section 1. Also, if you are installing several workstations, sort all cartons so that you have the complete set of devices required for each workstation. Verify that each workstation grouping has been moved into the correct office. Here is a list of subjects covered in Section 2:

- Preliminary notes
- Unpacking and inspection
- Installation checklist
- Preparing your processor unit
- Attaching modules
- Cabling the workstation
  - Monitors
  - Keyboards
  - Keyboard peripherals
  - Other peripherals
- Setting up workstation power

Preliminary Notes

As you read Section 2, bear the following thoughts in mind:

- Section 2 focuses on installing your processor unit, modules, and peripherals. Look for instructions on clustering and networking in Section 3 and the *CTOS Cluster and Network Hardware Installation Guide.*
- Section 2 discusses many different types of equipment. Your workstation may not include every component. Feel free to skip paragraphs that do not apply to your workstation.
- Remember to treat all directional references as though you were looking at the front of the equipment. In other words, "left" means "toward the left side as viewed from the front of the module."

Unpacking and Inspection

Begin your installation by unpacking your equipment. As you take the equipment out of its cartons, make sure to inspect it for any shipping damage. Please take a moment to fill out the ***Arrival Quality Report*** (AQR) cards shipped with your equipment. Save your cartons and packing material in case you decide to move your workstation later.

Use the following procedure to unpack and inspect each device in your workstation. Since this procedure is a general one, you may need to adjust the steps according to what you find when you open each package.

CAUTION

Some of the equipment in your workstation is fairly heavy. We strongly recommend that you have a second person help you lift such equipment out of the cartons. **Always** use safe lifting practices.

How to Unpack Your Equipment

1. Open the carton. If the carton includes an accessory bay, remove all items (cables, installation sheets, and so forth) from the bay.

   *Note: Although you may receive memory expansions or X-Bus cards for your B39 processor unit, do **not** unpack them. X-Bus cards and memory expansions must be installed by your service representative; do **not** handle them.*

2. Slide the device and foam packing (if present) out of the carton.
3. Free the device from the foam packing and remove the plastic bag.
4. Inspect the device for damage (dents, scratches, broken connector pins, and so forth). If the device is damaged, see the paragraph entitled "Damaged Equipment," below.
5. For X-Bus hard disk modules, copy the information from the media defects label located on the bottom of the module. To learn more, see your *Planning and Owner's Maintenance Guide.*
6. Check the packing material to ensure that you have found any cables, accessories, or installation sheets you may have missed.
7. When you finish unpacking all your cartons, briefly inventory the workstation cables. Make sure you have a set of cables or a power supply for each piece of equipment that needs one. Also, be sure you have enough ac line cables.

Damaged Equipment

If you receive a damaged device, contact your sales or Hotline representative for a replacement. When the damages are the result of shipper mishandling, you are also responsible for filing a claim against the carrier who delivered your equipment. In this case, save **all** shipping material and **immediately** contact the shipping firm for information on how to file a claim.

Laying Out Your Equipment

Before you start to install your equipment, place each device in its final location. This measure is especially important if you are installing an entire cluster or local area network (LAN). Run through the following checklist to make sure all the equipment is properly configured and in the right place.

- ❑ Each workstation has enough power supplies. If you have any questions, see the paragraph entitled "Setting Up Workstation Power," later in this section.
- ❑ The monitor for each workstation is compatible with the graphics controller.
- ❑ The placement of the modules is correct.
- ❑ The power cords reach the outlets.
- ❑ The cluster cables reach the processor unit.
- ❑ The LAN cables reach the LAN modules.
- ❑ You have decided on the location of each printer. You have made sure that the printer cables reach the processor unit and module string.

Preparing Your Processor Unit

You can modify your B39 processor unit by adding up to three X-Bus cards and up to five 4-megabyte memory expansions. If your workstation is configured to include X-Bus cards or memory expansions, you need to have your service representative install these components before you go any further. Do **not** attempt to install memory expansions or X-Bus cards yourself.

Note: *If you are planning to connect two serial peripherals to your processor unit and both peripherals have square connectors, make sure to inform your service representative. The use of square connectors has a bearing on which X-Bus card slot your service representative chooses.*

Attaching Your Modules

You can add modules to the right side of your processor unit. The following paragraphs tell you how to attach your modules if you are installing a new workstation. They also show you how to modify the procedure when you are simply adding a new module to an existing workstation. If your workstation does not include modules, skip this discussion.

Attaching Modules to a New Workstation

The following discussion assumes that your processor unit and modules are **not** plugged into a power source.

1. Slide the right edge of your processor unit to the edge of your work surface. Let the edge hang slightly over the side of the table.
2. Reach under the middle of the right side cap. Remove the cap by pulling it outward and upward (see Figure 2–1). Lay the cap aside.
3. Slide the processor unit back onto the work surface and select the first module in your configuration plan.
4. Lift the latch on the left side of the module. Make sure that the latch is horizontal, as shown in Figure 2–1.
5. Set the module next to the processor unit and line up the connectors.
6. Push the two units together, beginning at the rear.
7. When the connectors are aligned and seated, lower the latch. This step locks the two units together.

   Notes:

   - *Sometimes the latch is stiff. However, as long as it moves, you are performing the step correctly.*
   - *If the latch does not move, separate the units and inspect them for bent pins or connectors. Call your service representative if you find any bent pins.*
8. Squeeze the modules together at the bottom to ensure a solid electrical connection. SCSI modules need a few extra squeezes.

9. Repeat steps 4 through 8 for the remaining modules, connecting each module to the right end of the string.
10. Locate the side cap you removed from the processor unit in step 2.
11. Position the cap against the right side of the last module in the string. Make sure that the three alignment ears on the cap are hooked into the slots on the module.
12. Push the side cap firmly against the module for proper seating.

Attaching Modules to an Existing Workstation

To attach a module to an existing workstation, complete the procedure just discussed, but make the following modifications:

- Before you start the procedure, make sure to perform these steps:
  1. Turn off the Power switch on the front of the processor unit. Unplug the processor unit from the wall outlet.
  2. Unplug the power supplies from the wall outlets and module string.
- If you are adding the module to the middle of the string, complete these steps:
  1. Raise the latch between the two modules that will lie on either side of the new module.
  2. Separate the two parts of the string and insert the new module.
  3. Lower the latch on the new module and the module to its immediate right. This step reconnects the string.
- If you are adding the module to the end of the string, complete these steps:
  1. Reach under the middle of the right side cap on the last module in the string. Remove the cap.

     Note: *You may need to move the workstation to the edge of your table to more easily grip the side cap.*
  2. Add the new module to the end of the string, lower the latch, and replace the right side cap.

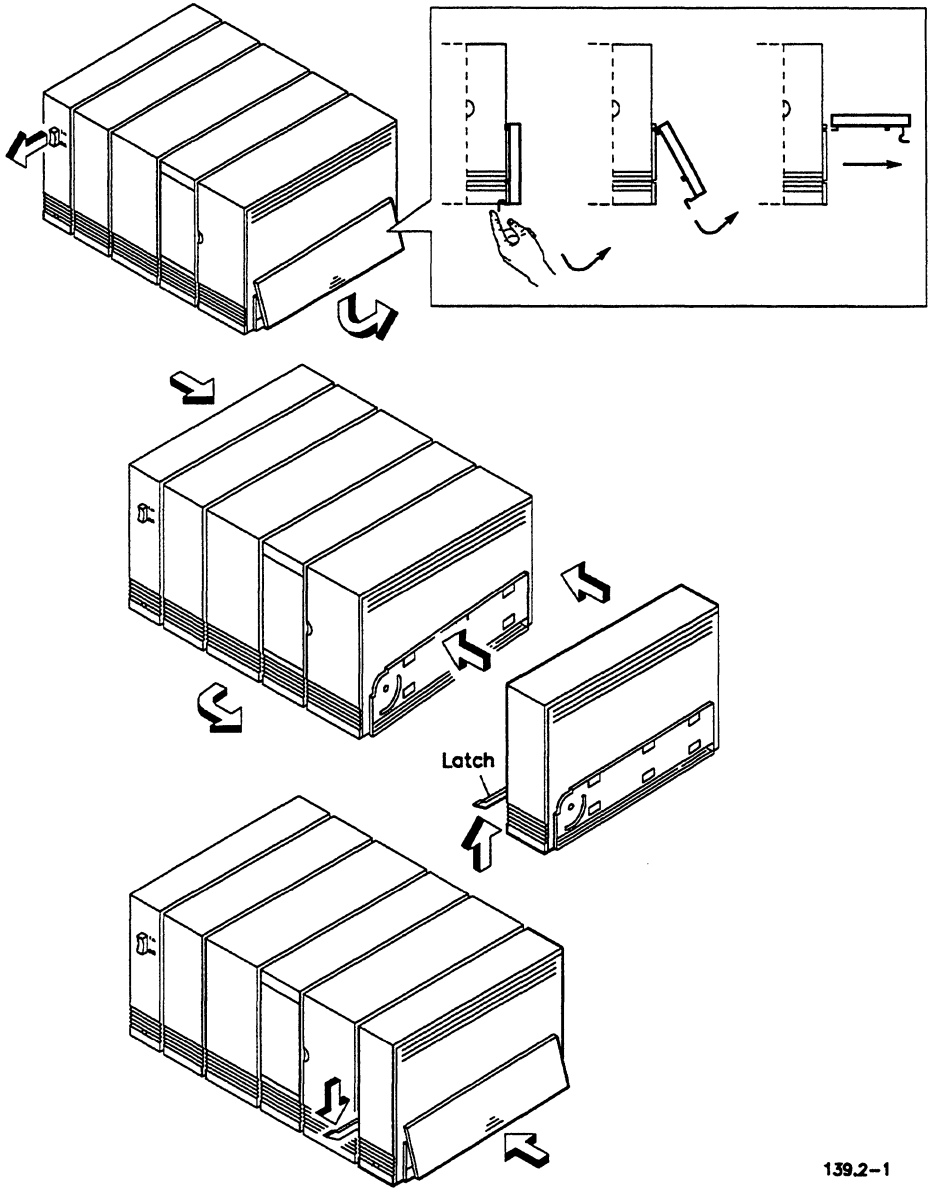


Figure 2–1. Attaching a Module

Cabling Your Workstation

Now that you have constructed your module string, you can connect peripherals, financial devices, and data communications devices to your workstation. You attach this type of equipment using the cables that arrived with your order.

As a rule, you cable these devices to I/O receptacles in your processor unit or module string. However, some peripherals and financial devices attach to your monitor or keyboard instead. Also, with some devices, you can choose between several different connection points. For example, a serial printer can be attached to either the processor unit or a B25-PEM module.

The following paragraphs outline the connection procedures for the various peripherals and other cabled devices. These procedures typically cover cabling for the processor unit/module end of the connection only. For discussions of the other end of the connection, read the installation guide for the product in question. If you have trouble deciding whether to connect a particular peripheral to the processor unit or to a module, read the "Compatibility" section in the *CTOS Workstations Planning and Owner's Maintenance Guide.*

Before You Start

Your workstation's I/O receptacles are located at the rear of the processor unit and module string. Before you start to cable your workstation, look at your equipment and familiarize yourself with the type of receptacles your workstation provides.

As you study your processor unit and modules, note that some of the cable receptacles are hidden by protective covers. If you are planning to use any of these receptacles, you need to remove the covers now.

The following paragraphs discuss the receptacles you will find on your processor unit and modules. This discussion also tells you how to remove the cable covers.

Processor Units

B39 processor units incorporate five or more cable receptacles, depending whether the processor unit includes X-Bus cards. These receptacles allow you to attach printers, financial devices, modems, monitors, clusters, and ISDN networks.

Note: *If you want to directly attach your processor unit to an ISDN network, you need to have your service representative install a B25-DN1 X-Bus card. As an alternative, you can use a B25-DN2 module.*

Receptacle Type and Location

To familiarize you with processor unit cabling, Table 2–1 lists each processor unit receptacle and the type of equipment you can attach to it. As a visual aid, Figure 2–2 shows the layout of these receptacles.

Table 2–1. Processor Unit I/O Receptacles

Cable Receptacle	Attachments	Number of Receptacles
Video *	Monitor	1
Parallel Device	Parallel Device (Printers, Scanners, and so forth)	1
Serial Device	Serial Devices (Printers, Modems, and so forth)	2
Cluster †	TeleCluster™ Configurations or RS-422/485 Clusters	2

* Only present when your processor unit includes a graphics controller X-Bus card. If the processor unit does not include a graphics controller X-Bus card, you must connect your monitor to a graphics module.

† See Section 3 for information on this attachment.

Cable Covers

To view the receptacles, remove the cable cover as follows:

1. If your workstation is already installed and you are simply modifying a connection, complete these steps:
   a. Turn off the Power switch on the front of the processor unit. Unplug the processor unit from the wall outlet.
   b. Unplug the power supplies from the wall outlets and module string.
2. Facing the rear of your processor unit, locate the arrow imprints on either side of the cable cover (see Figure 2–2).
3. Press inward on both arrow imprints. This step frees the cover from its slots.
4. Swing the cover upward and lift it away from the processor unit. Take a moment to study the receptacle layout in Figure 2–2.

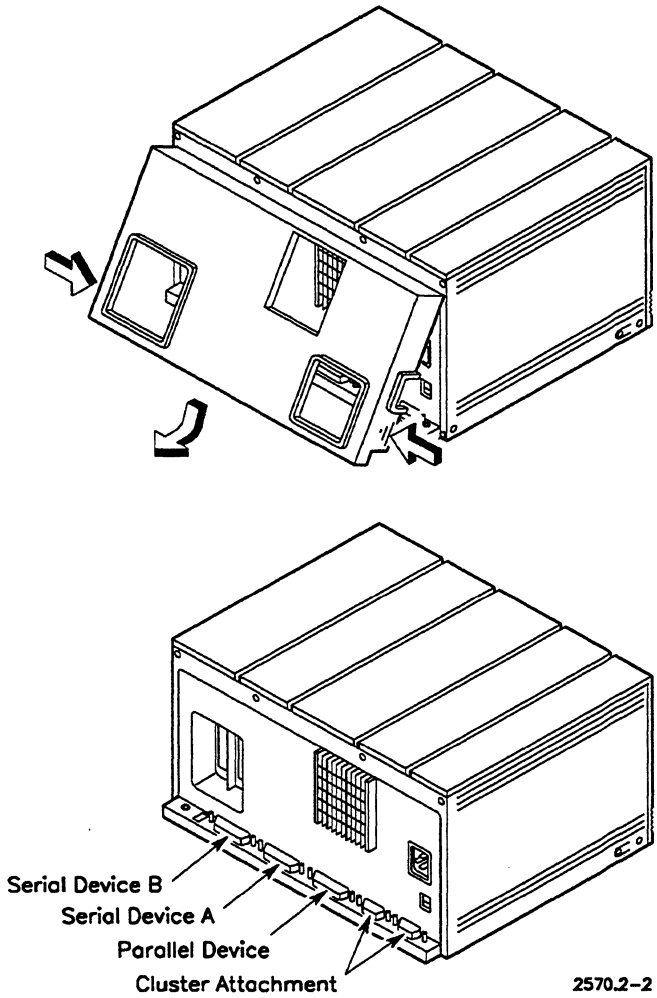


Figure 2–2. Removing the Processor Unit Cable Cover

Modules

As you installed your module string, you probably noticed that each of your modules has at least one cable receptacle. You attach cables to these receptacles according to your configuration plan and the needs of your equipment.

The way that a module is cabled depends on the tasks it performs. For example, the B25-PEM peripheral extension module serves as an interface for serial peripherals, PIN keyboards, and magnetic card readers (MCRs). In keeping with this function, the B25-PEM includes two RS232 receptacles and one PIN/MCR receptacle. When you install this module, you attach cables to one or more of these receptacles according to how many peripherals your workstation includes.

You can start attaching cables as soon as you have built your module string. However, before you connect your power cables, read the paragraph entitled "Setting Up Workstation Power," later in this section. Also, do **not** attach cables to your LAN modules (B25-EN3 and B25-TR2) until you have read Section 3.

Receptacle Type and Location

The B2X/B3X product line features several different module styles, each with a different set of receptacles. Table 2–2 classifies the different modules according to their receptacles. This table also tells you what type of equipment attaches to each receptacle and provides you with the number of receptacles. Figure 2–3 shows you the position of the receptacles for each module type.

Note: *In the rare event that you are installing a B25-FXC or modules with a B27 prefix, see the* BTOS Hardware Installation Guide.

Table 2–2. Module Receptacles

Module Type *	Receptacles	Attachments	Number of Receptacles
All Graphics Modules	Video	Monitor	1
	Power	Power Supply	1
All Disk, Tape, CD-ROM, and 1PC Modules **	Power	Power Supply	1
PEM	RS232 (Serial)	Serial Devices (Printers, Modems, and so forth)	2
	PIN/MCR	FSA Devices (Magnetic Card Readers and PIN Keypads) †	1
	Power	Power Supply	1
IDS and ID2 **	Data U (Channel A)	See the *BTOS Intelligent Data Communication Module Systems Software (IDMSS) Operations Guide*	1
	Data D (Channel A)		1
	TDI (Channel A)		1
	X.21 (Channel B)		1
	RS232/TDI (Channel B)		1
	Power	Power Supply	1
DN2 ‡	RJ45	Wide Area Networks (WANs)	1
	Power	Power Supply	1
DCX **	X.21	Wide Area Networks (WANs)	1
	RS232	Serial Devices (Printers, Modems, and so forth)	4
EN3 and TR2 §	LAN	Ethernet or Token Ring LAN Cabling	1
	Power	Power Supply	1
TEL	Phone	Telephone	1
	Line	Data Transmission Lines	2
	Power	Power Supply	1

* The B25 prefix has been omitted from all module titles for clarity.

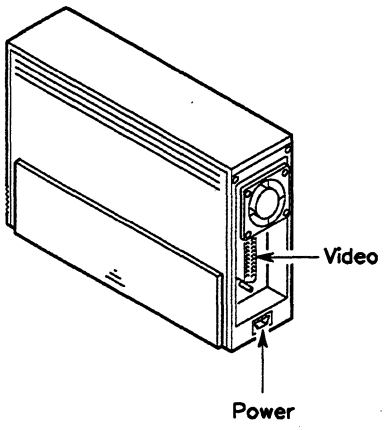
** These modules do **not** have removable cable covers.

† FSA stands for financial systems architecture.

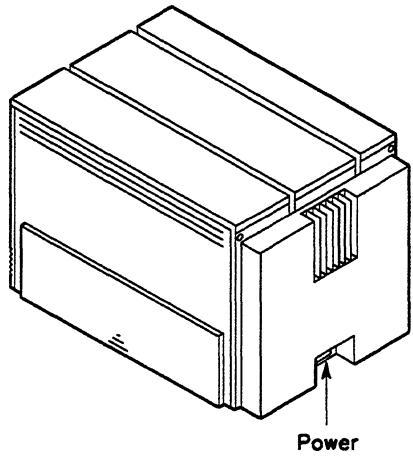
‡ See Section 3 for information on this attachment.

§ See Section 3 for information on this attachment. These modules do **not** have removable cable covers.

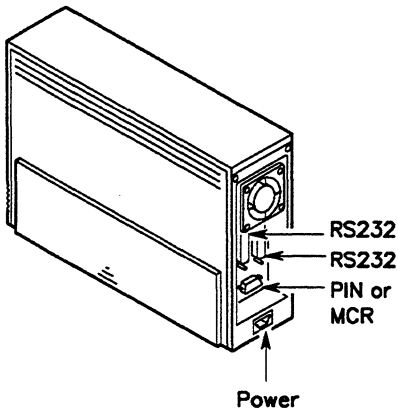
All Graphics Modules



Disk, Tape, CD–ROM, and 1PC Modules
(B25–1PC is a narrower module)



PEM Modules



139.2-3a

IDS and ID2 Modules

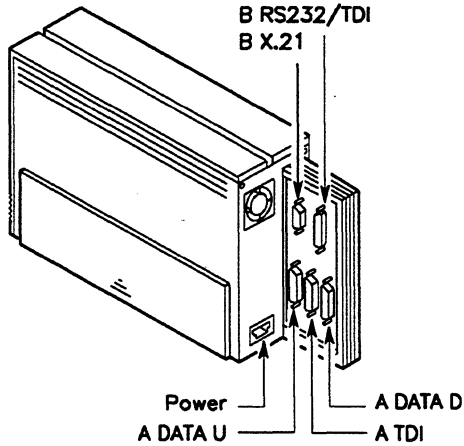


Figure 2–3. Module Receptacles (Part 1 of 2)

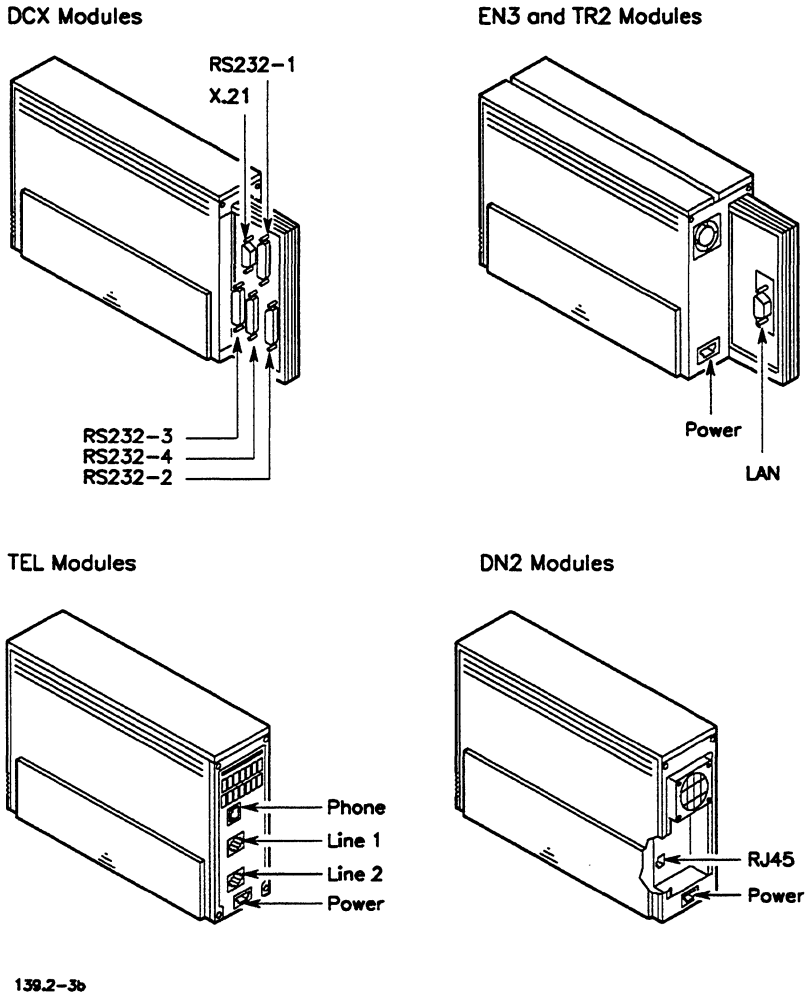


Figure 2–3. Module Receptacles (Part 2 of 2)

Cable Covers

To protect the connections, the cable receptacles in graphics, B25-PEM, B25-TEL, and B25-DN2 modules are hidden from view by cable covers. Before you attach any cables, you need to remove these covers, as follows:

1. If your workstation is already installed and you are simply modifying a connection, complete the following steps:
   a. Turn off the Power switch on the front of your processor unit. Unplug the processor unit from the wall outlet.
   b. Unplug the power supplies from the wall outlets and module string.
2. Facing the rear of the module string, locate the arrow imprints on either side of the cable cover (see Figure 2–4).
3. Place your hand around the cable cover and squeeze the arrow imprints. This step frees the cable cover from the slots in the module frame.
4. Swing the cable cover up and lift it away from the module.

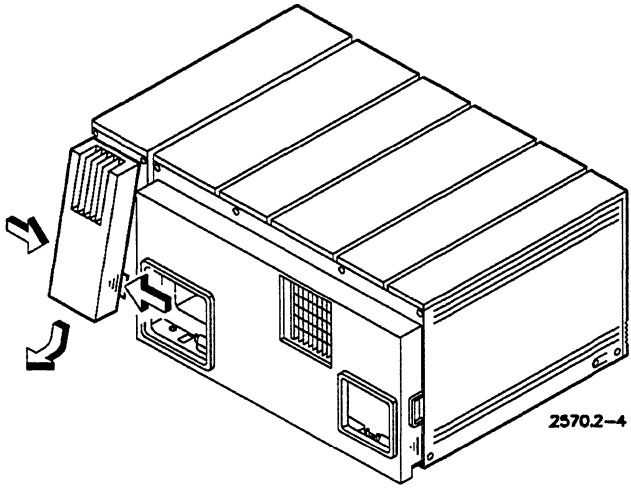


Figure 2–4. Removing a Module Cable Cover

Installing Your Monitor

The following paragraphs tell you how to install your monitor. Before you start, verify that your monitor is compatible with your workstation. If you are not sure, read the "Compatibility" section in the *CTOS Workstations Planning and Owner's Maintenance Guide*. Those of you not installing a monitor at this time can skip this discussion.

Preparing an SG-120-D Monitor

If you ordered an SG-120-D, you received two pieces of equipment: a PWM-100-COL monitor and an SG-102-D back panel. You need to attach the back panel to the monitor before connecting the SG-120-D, as a whole, to your workstation. This panel secures electrical connections critical to video operation, so do **not** leave the panel off the monitor. To install the back panel, complete the following steps:

1. Make sure that the monitor is turned off and unplugged from the wall.
2. Locate the monitor cable that arrived with the back panel. Plug the right-angle connector into the video receptacle at the rear of the monitor.
3. Hold the back panel at an angle (see Figure 2–5). Slide the alignment ears at the top of the panel into the slots on the rear of the monitor.
4. Rotate the back panel downward so that it lies flat against the rear of the monitor. Secure the panel by latching the two clips at the bottom.

   Note: *Make sure to guide the video cable through the cutout at the bottom of the back panel. If you do not route the cable correctly, you will not be able to latch the panel into place.*

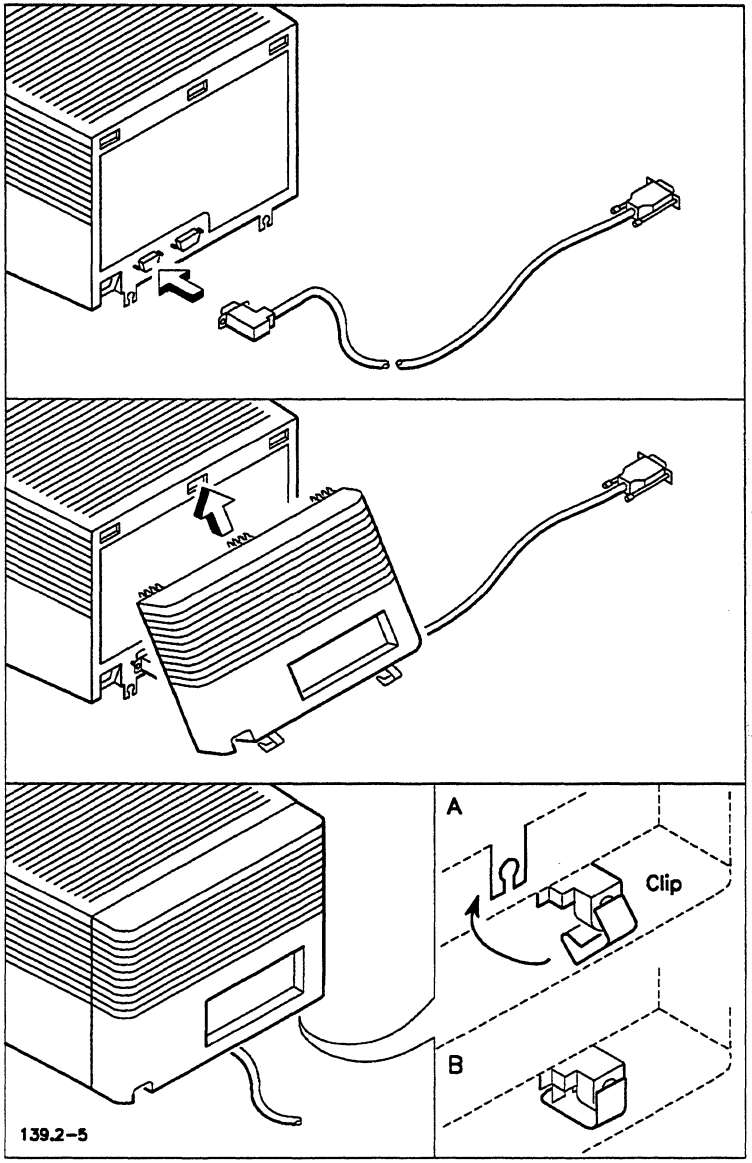


Figure 2–5. Attaching a Back Panel to Your Monitor

VGA Monitors

If you have a B25-VDC, B25-VDM, SG-120-D, VGA-200-MON, VGA-931-VDM, or off-the-shelf VGA monitor, you need to install a B25-VKA adapter before you can connect your monitor to your workstation. To install the adapter, complete the following procedure:

1. Ensure that your monitor is turned off and unplugged from the wall.
2. Locate your monitor cable, B25-VKA adapter, and the cable that attaches the adapter to your module string.
3. If the monitor cable is not already attached to your monitor, plug it in. Secure the cable by tightening the two connector screws.

   Note: *Some cables have only one connector screw. This screw is located at the top of the connector.*

4. Plug the free end of the monitor cable into the B25-VKA adapter (see Figure 2–6). Secure the cable by tightening the two connector screws.
5. Study the cable that you will use to connect the B25-VKA to the graphics controller (X-Bus card or graphics module). Note the difference in the connectors.
6. Look at Figure 2–6 and select the end reserved for the B25-VKA adapter. Plug this end of the cable into the B25-VKA and secure it by tightening the two connector screws.

   Note: *Do not attach the free end of this cable yet. You will complete this connection when you perform the steps described in the next two paragraphs.*

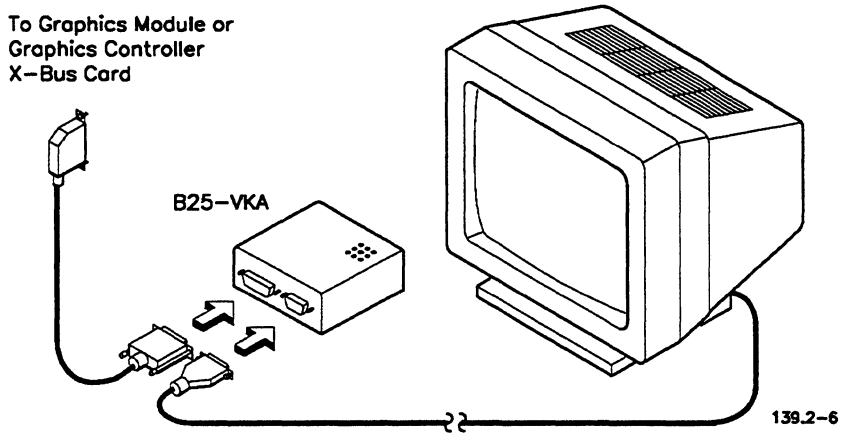


Figure 2–6. Preparing a VGA Monitor

Connecting Your Monitor

You can connect your monitor to a graphics controller X-Bus card or graphics module. Read the following paragraphs to learn about these connections.

Connecting Your Monitor to Your X-Bus Card

To connect your monitor to an X-Bus card, complete the following steps. If you plan to connect your monitor to an X-Bus card, your module string should **not** include a graphics module.

1. If you are exchanging a monitor in a workstation that is already installed, ensure that the processor unit is turned off and unplugged. Also, make sure to disconnect both ends of each power supply.
2. Ensure that your monitor is turned off and unplugged from the wall.
3. If the monitor cable is not already attached to your monitor, plug it in. Secure the cable by tightening the two connector screws.

   Note: *Some cables have only one connector screw. This screw is located at the top of the connector.*
4. If you have not already done so, remove the cable cover from the rear of your processor unit.
5. Route the monitor cable through the cover cutout (see Figure 2–7).
6. Plug the free end of the monitor cable or B25-VKA adapter cable into the receptacle on your X-Bus card. Secure the cable by tightening the two connector screws.
7. If you are planning to install more peripherals or connect your workstation to a cluster, leave the cable cover off the processor unit. Otherwise, replace the cover.

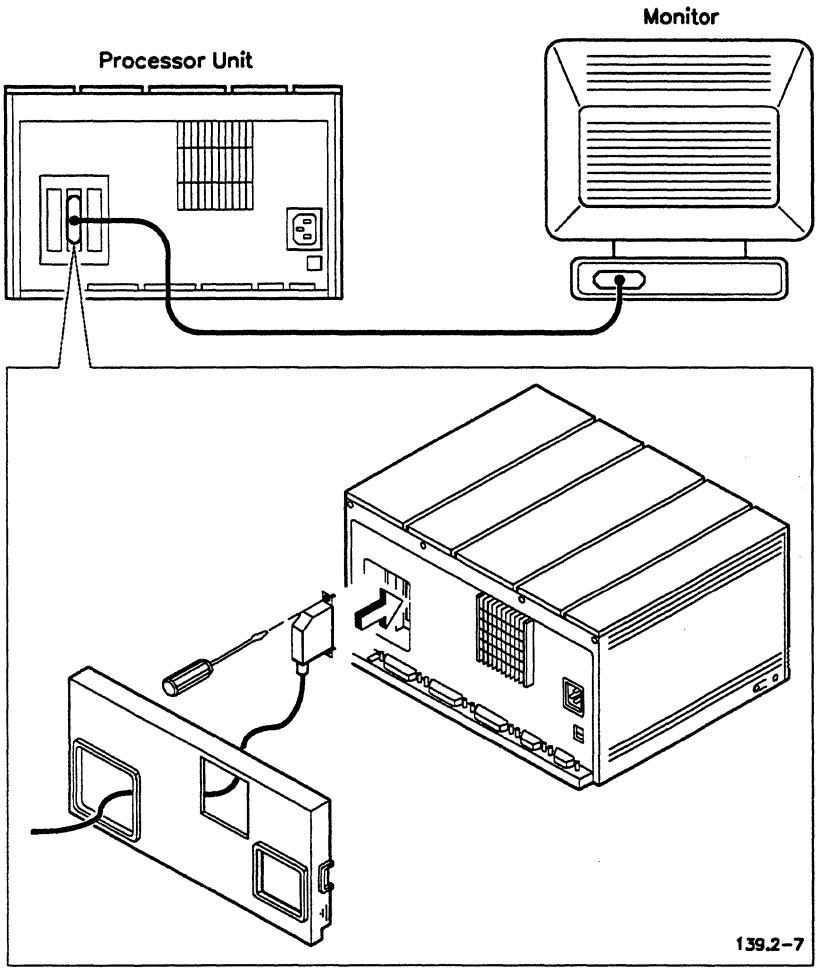


Figure 2–7. Connecting Your Monitor to an X-Bus Card

Connecting Your Monitor to Your Graphics Module

To connect your monitor to your graphics module, complete the following steps. If your monitor is already attached to an X-Bus card, disconnect the monitor from the card before starting this procedure.

1. If you are exchanging a monitor in a workstation that is already installed, ensure that the processor unit is turned off and unplugged. Also, make sure to disconnect both ends of each power supply.
2. Ensure that your monitor is turned off and unplugged from the wall.
3. If the monitor cable is not already attached to your monitor, plug it in. Secure the cable by tightening the two connector screws.

   Note: *Some cables have only one connector screw. This screw is located at the top of the connector.*
4. If you have not already done so, remove the cable cover from the rear of the module.
5. Plug the free end of the monitor cable or B25-VKA adapter cable into the receptacle at the rear of your graphics module (see Figure 2–8). Secure the cable by tightening the two connector screws.
6. Reinstall the graphics module cable cover, making sure that the monitor cable is routed out of the bottom.

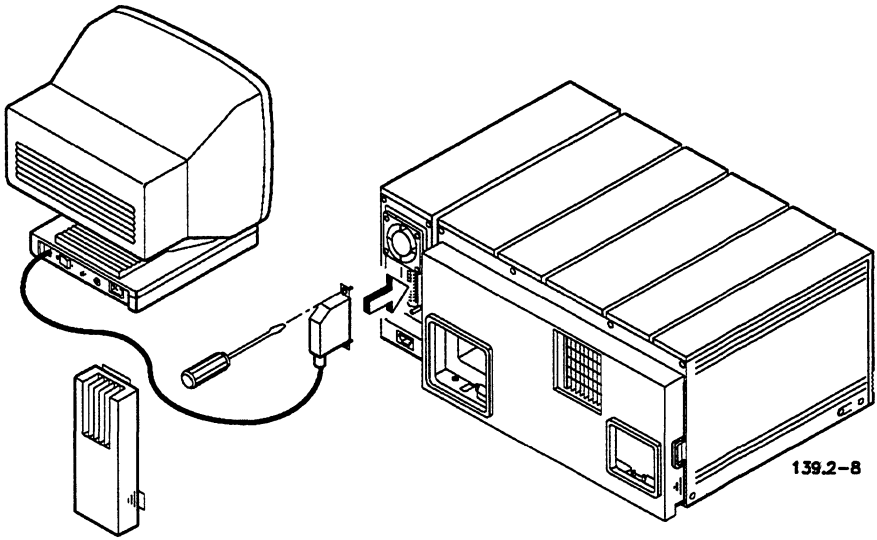


Figure 2–8. Connecting Your Monitor to a Graphics Module

Connecting Your Keyboard

You connect your keyboard to your monitor. If you are setting up your workstation for IBM PC® emulation, you need to customize your keyboard before you install it. The following paragraphs discuss keyboard installation and customizing procedures. Those of you not installing a keyboard at this time can skip the following paragraphs.

Preparing Your Keyboard for IBM PC Emulation

If you have a B25-K1, B25-K2, B25-K3, or B25-K5 keyboard and plan to operate your workstation in IBM PC emulation mode, you need to affix special-purpose labels to some of the keys on your keyboard. These labels are part of the PC emulation software package you received. Use the following procedure to apply your labels. Table 2–3 tells you which labels go on which keys.

Note: *Apply your labels to the front surface of the appropriate keys, not the top surface.*

1. Open the label package and make sure you have the following items:
   - One or two strips of keypad labels
   - A wooden label applicator
   - A cloth
2. Make sure that your keyboard is unplugged. This measure prevents unwanted keystrokes during label application.
3. Tear off a label at the perforations.
4. Clean the front surface of the appropriate key (see Table 2–3) with the cloth.
5. Peel the backing off the label.
6. Hold the label against the front surface of the key. Center the label using the alignment marks above the text of the label.
7. Rub the label using the curved end of the wooden applicator.

8. Carefully peel the label forward, leaving the cutout portion affixed to the key and removing the remainder.
9. Hold the cloth over the key. Rub with the wooden applicator to smooth the label.
10. Repeat steps 3 through 9 for each of the other labels.

Table 2–3. Key Labels

PC Emulation Label	Key
Pg Up	**PREV PAGE**
Pg Dn	**NEXT PAGE**
Home	**SCROLL UP**
End	**SCROLL DOWN**
Esc	**CANCEL**
Break	**MOVE**
Del	**DELETE**
Ins	**OVERTYPE**
Alt	**COPY**
Ctrl *	**CODE**
Prt Sc	**1/4-1/2**
Enter	**RETURN**
Num Lk	**MARK**
Scroll Lk	**BOUND**
Sys Req	**GO**
+	**NEXT**

* Package includes two of these labels, one for each **CODE** key.

Installing Your Keyboard

To connect your keyboard to your monitor, complete the following steps:

Note: *If you have an SG-101-K keyboard, be sure to order an SG-151-K keyboard cable; this cable has rectangular connectors on both ends.*

1. Locate your keyboard cable and attach one end to your monitor, as shown in Figure 2–9. Make sure that the connector clicks into place.

   Notes:

   - *If you have a B25-CA1, B25-GS1, or B25-PD8 monitor, your keyboard cable is permanently attached to your monitor.*
   - *If you have a B25-VDM, B25-VDC, SG-120-D, VGA-200-MON, VGA-931-VDM, or off-the-shelf VGA monitor, you attach the keyboard cable to the B25-VKA adapter instead of the monitor.*

2. Connect the other end of the cable into either of the receptacles at the back of the keyboard. Listen for the click.
3. If you want to tilt your keyboard, raise the rear prop located on the bottom of the keyboard.

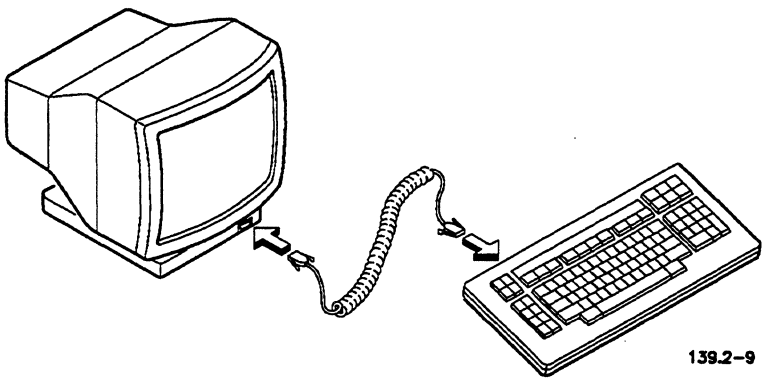


Figure 2–9. Connecting Your Keyboard to Your Monitor

Connecting Your Keyboard Peripherals

You can connect one peripheral to your keyboard. The peripherals designed for keyboard connection include mice, graphics tablets, and magnetic card readers (MCRs). To connect this equipment, simply attach the peripheral cable to the keyboard (see Figure 2–10). Make sure that the connector clicks into place. Remember, you can only attach **one** peripheral to your keyboard.

Notes:

- *Certain keyboard / MCR combinations require special mounting hardware. See the appropriate product documentation for a description of how to install this hardware.*
- *If you want to configure an MCR in addition to one of the other keyboard peripherals, you must connect the MCR to your processor unit, B25-PEM module, or B25-DCX module. Some of these connections require special converters. For more information, see the installation material for the MCR.*

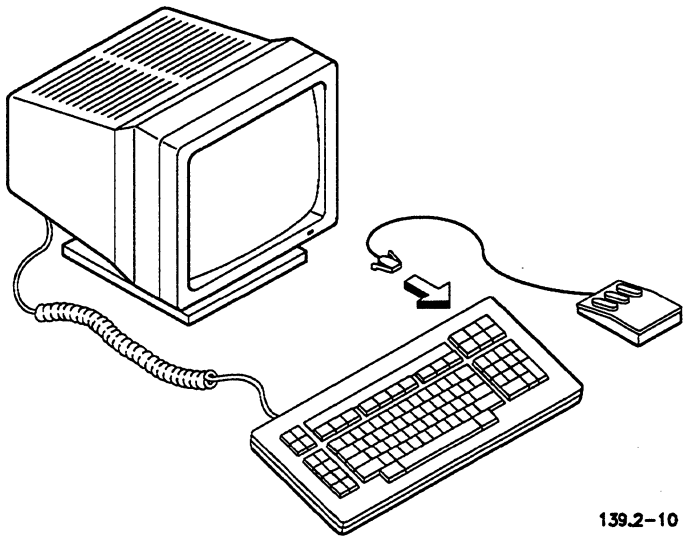


Figure 2–10. Connecting a Peripheral to Your Keyboard

Connecting Other Peripherals

You can attach a wide selection of other peripherals to your workstation. These peripherals include printers, optical readers, modems, special banking equipment, and so forth. You generally attach these peripherals to your processor unit. However, if you have a B25-PEM, B25-DCX, or B25-IDS/ID2 module, you can connect certain peripherals to these as well.

Before connecting any peripheral, make sure that it is compatible with your workstation. The *CTOS Generic Print System Administration Guide* can prove helpful if you are not sure whether your workstation supports your printer. The following paragraphs explain how to connect various peripherals to your workstation. If you are not installing any of the peripherals mentioned above, skip this discussion.

Connecting a Peripheral to Your Processor Unit

Your processor unit is equipped with receptacles for one parallel device (usually a printer) and two serial devices (printers, modems, and so on). Here is how you attach them.

Parallel Devices

1. If you are adding a parallel device to a workstation that is already installed, ensure that the processor unit is turned off and unplugged. Also, make sure to disconnect both ends of each power supply.
2. Ensure that the device is turned off and unplugged from the wall.
3. If an interface cable is not already attached to the device, plug one in and tighten any connector screws.
4. If you have not already done so, remove the cable cover from the rear of your processor unit.
5. Route the interface cable through the cover cutout (see Figure 2–11).
6. Plug the free end of the interface cable into the Parallel Device receptacle. Secure the cable by tightening the two connector screws.
7. If you are planning to install more peripherals or connect your workstation to a cluster, leave the cable cover off the processor unit. Otherwise, replace the cover.

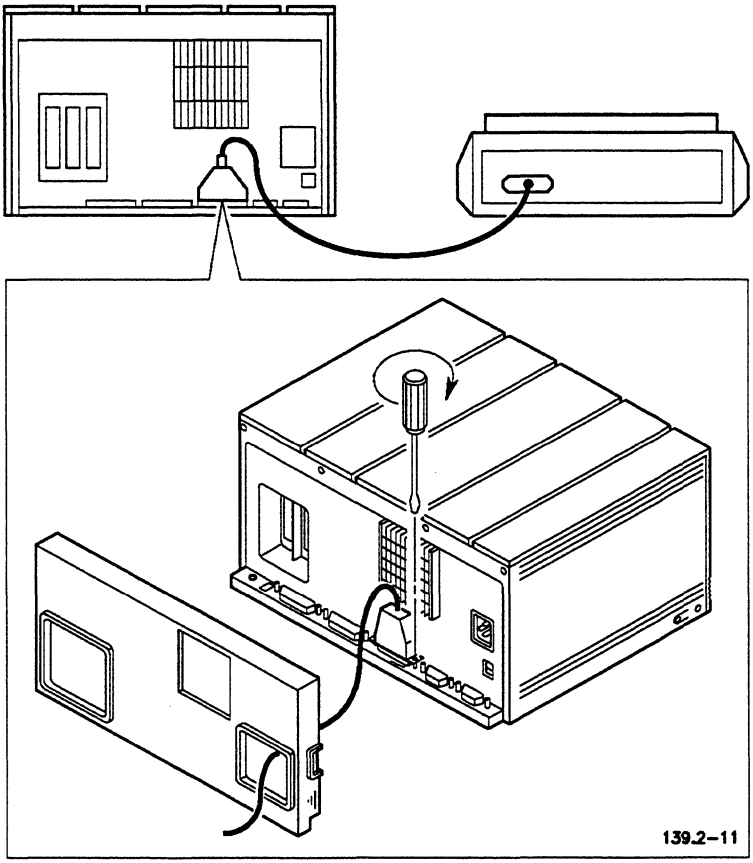


Figure 2–11. Connecting a Parallel Device to Your Processor Unit

Serial Devices

1. If you are adding a serial device to a workstation that is already installed, ensure that the processor unit is turned off and unplugged. Also, make sure to disconnect both ends of each power supply.
2. Ensure that the device is turned off and unplugged from the wall.
3. If an interface cable is not already attached to the device, plug one in and tighten any connector screws.
4. If you have not already done so, remove the cable cover from the rear of your processor unit.
5. Route the interface cable through the cover cutout (see Figure 2–12).
6. Plug the free end of the interface cable into the right hand Serial Device (Channel A) receptacle. Secure the cable by tightening the two connector screws.
7. Repeat steps 3 through 6 if you are installing a second serial device. In this case, attach the interface cable to the left hand Serial Device (Channel B) receptacle.

   Notes:

   - *If you have two serial devices, remember which port (Channel A or B) you used for the printer. You will need this information when you install your printing programs.*
   - *When a graphics controller X-Bus card is installed in the slot nearest the processor unit's floppy disk drive, the second serial device should have a tapered RS232 connector (see Figure 2–12). Square connectors interfere with the monitor connection. If both of your serial devices have square connectors, contact your service representative.*
8. If you are planning to install more peripherals or connect your workstation to a cluster, leave the cable cover off the processor unit. Otherwise, replace the cover.

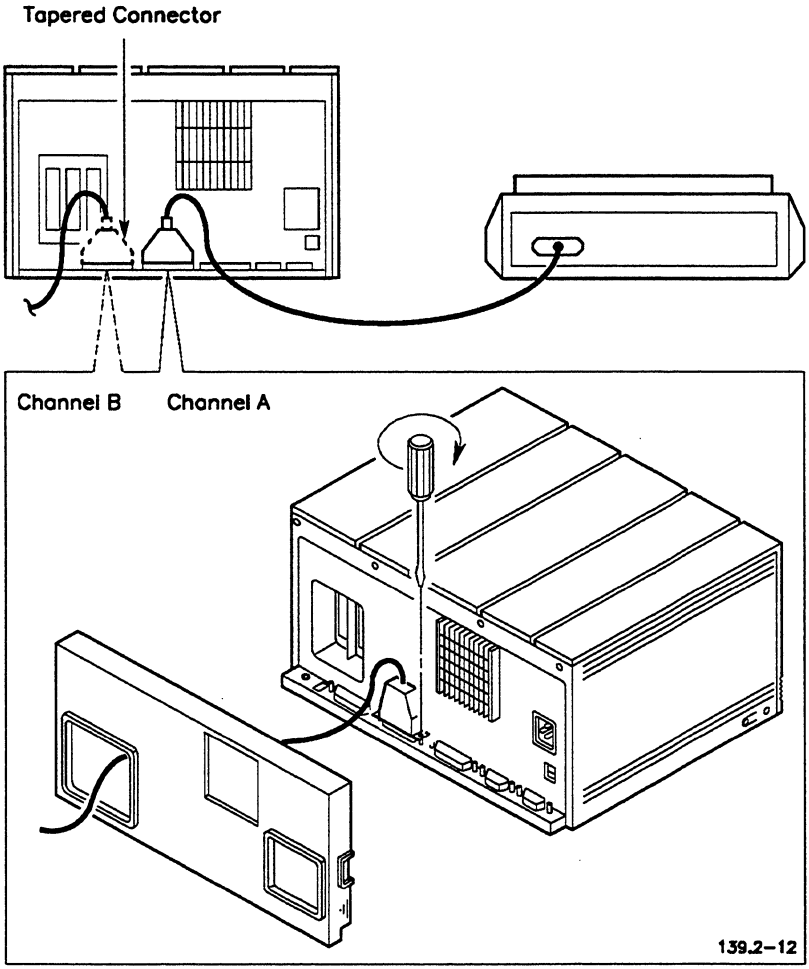


Figure 2–12. Connecting a Serial Device to Your Processor Unit

Connecting a Peripheral to a B25-DCX Module

If you have a B25-DCX module, you can attach up to four additional serial devices to your workstation. Since some of this equipment may require special adapters, make sure to read all installation instructions for each of these devices. To connect these devices or their adapters, complete the following steps:

1. If you are reconfiguring the serial devices for a B25-DCX that is already installed, ensure that the processor unit is turned off and unplugged. Also, make sure to disconnect both ends of each power supply.
2. Ensure that each serial device is turned off and unplugged from the wall.
3. If an interface cable is not already attached to the first serial device, plug one in and tighten any connector screws.
4. Repeat step 3 for each remaining serial device.
5. Review your serial devices and select the one with the highest baud rate.
6. Plug the interface cable from this device into the RS232-1 receptacle (see Figure 2–3 for the location). Secure the cable by tightening the two connector screws.
7. Repeat step 6 for the remaining devices. The connection order is as follows:

Baud Rate	Receptacle
Highest	RS232-1
2nd Highest	RS232-2
3rd Highest	RS232-3
Lowest	RS232-4

8. If you are connecting your workstation to a WAN via the B25-DCX module, plug the WAN cable into the X.21 receptacle and secure it by tightening the connector screws.

Connecting a Peripheral to a B25-PEM Module

If you have a B25-PEM module, you can attach up to two additional serial devices and one PIN keypad/MCR to your workstation. To connect these devices to the B25-PEM, complete the following steps:

Note: *If you plan to connect this module to a power supply, complete the power cabling before you start the following procedure. See the paragraph entitled "Setting Up Workstation Power," later in this section.*

1. If you are reconfiguring the attachments for a B25-PEM that is already installed, ensure that the processor unit is turned off and unplugged. Also, make sure to disconnect both ends of each power supply.
2. Ensure that each serial device is turned off and unplugged from the wall.
3. If an interface cable is not already attached to the first peripheral, plug one in and tighten any connector screws.
4. Repeat step 3 for any remaining peripherals.
5. If you have not already done so, remove the cable cover from the rear of the module.
6. Plug the interface cable from your first peripheral into the proper receptacle (see Figure 2–3 for the location). Secure the cable by tightening the two connector screws.
7. Repeat step 6 for the remaining peripheral cables.
8. Reinstall the cable cover.

Connecting a Peripheral to a B25-IDS or B25-ID2 Module

B25-IDS and B25-ID2 modules provide two channels: A and B. The receptacles for Channel A are Data U, Data D, and TDI. The Channel B receptacles are RS-232/TDI and X.21. Because much of the cabling for these modules depends on your software, this guide does not provide instructions. When you are ready to attach your peripherals, check your *BTOS Intelligent Data Communication Module Systems Software (IDMSS) Operations Guide* for the correct cable configuration.

Connecting Cables to Your Voice Processor Module

If you have a B25-TEL module, you can attach your telephone to your workstation. This connection is used for several applications, notably the OFIS® Mail and OFIS Document Designer™ programs; the B25-TEL module also features automatic phone answering capabilities. The B25-TEL has one phone receptacle, two line receptacles, and one power receptacle so that you can attach a power supply.

The way you cable the B25-TEL depends on whether your workstation is part of a TeleCluster configuration. If it is, you need to determine the type of TeleCluster configuration you have (voice-over-data or data-only). Those of you who are not sure should look at your TeleCluster adapter and compare it with the two examples in Figure 2–13.

If you have a voice-over-data TeleCluster adapter (B25-TA1 or B25-TA2) and plan to use the voice-over-data facilities, complete the first of the following two procedures. The rest of you should perform the second procedure.

Note: *If you plan to connect this module to a power supply, complete the power cabling before you start the following procedure. See the paragraph entitled "Setting Up Workstation Power," later in this section.*

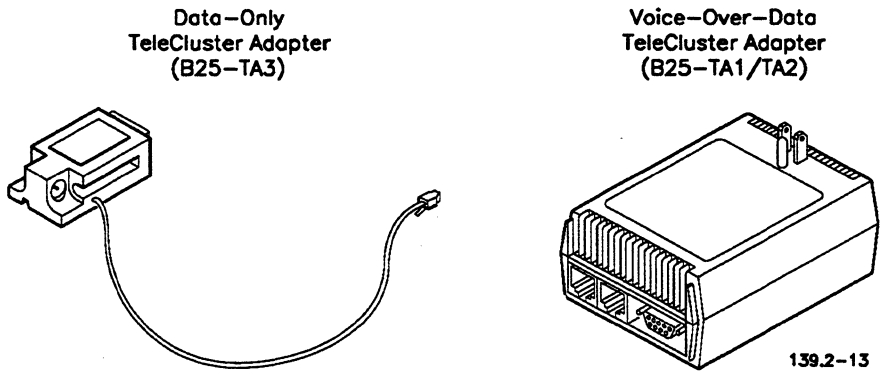


Figure 2–13. TeleCluster Adapters

Voice-Over-Data TeleCluster Configurations

1. If you are adding the B25-TEL to an existing workstation, ensure that the processor unit is turned off and unplugged. Also, make sure to disconnect both ends of each power supply.
2. If you have not already done so, remove the cable cover from the rear of the module.
3. Locate the special-purpose cable that arrived with your B25-TEL module. Note that one end has a clear connector and the other has a smoke-colored connector imprinted with the letters "VP" (voice processor).
4. Connect the "VP" end of the special-purpose cable into the topmost (Phone) receptacle on the module (see Figure 2–14).
5. Connect the other end of the cable into your telephone.
6. Connect a telephone cable from the "Phone" receptacle on the TeleCluster adapter to the second highest (Line 1) receptacle on the module.
7. Connect a telephone cable from the "Wall" receptacle on the TeleCluster adapter to the telephone wall jack.

   Note: *Do not attach the TeleCluster adapter to the wall outlet at this time.*

8. Attach an RS-422/485 cable to the cluster receptacle on the TeleCluster adapter. Secure the connection by tightening the two screws.

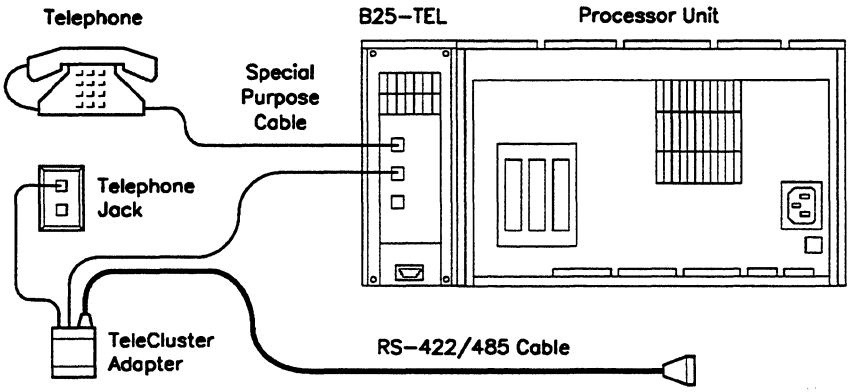
   Note: *Do not attach the other end of the RS-422/485 cable at this time.*

9. Replace the cable cover, making sure that the cables are routed out of the bottom.

Data-Only TeleCluster Configurations and Non-TeleCluster Workstations

1. If you are adding the B25-TEL to an existing workstation, ensure that the processor unit is turned off and unplugged. Also, make sure to disconnect both ends of each power supply.
2. If you have not already done so, remove the cable cover from the rear of the module.
3. Locate the special-purpose cable that arrived with your B25-TEL module. Note that one end has a clear connector and the other has a smoke-colored connector imprinted with the letters "VP" (voice processor).
4. Connect the "VP" end of the special-purpose cable into the topmost (Phone) receptacle on the module (see Figure 2–14).
5. Connect the other end of the cable into your telephone.
6. Connect a telephone cable from the upper wall jack to the second highest (Line 1) receptacle on the module.
7. If you want two-line switching capability, connect a telephone cable from the lower wall jack to the third highest (Line 2) receptacle on the module.
8. Replace the cable cover, making sure that the cables are routed out of the bottom.

B25–TEL CABLING (Voice–Over–Data TeleCluster)



B25–TEL CABLING (Data–Only TeleCluster and Non–TeleCluster)

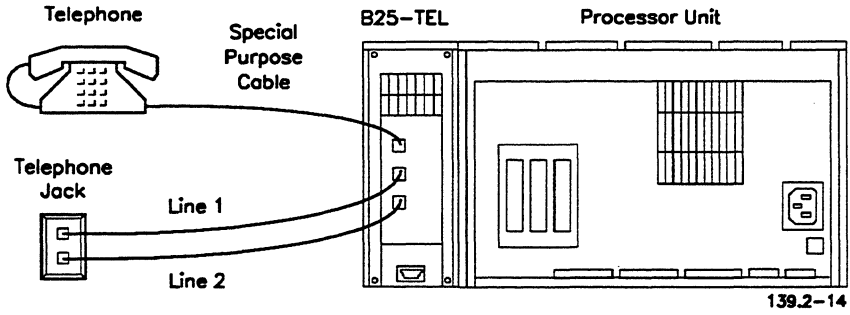


Figure 2–14. Cabling a B25-TEL Module

Setting Up Workstation Power

Before you turn on your workstation, you need to ensure that your equipment voltage parameters accommodate the wall voltage. You also need to connect one or more power supplies to your workstation. The following paragraphs outline these procedures.

Note: *Power supply placement is critical to proper workstation operation. If you are not certain how many power supplies to use or where to place them, reread the paragraph entitled "Power Configuration" in the* Planning and Owner's Maintenance Guide.

Verifying Your Voltage Parameters

AC wall voltage is supplied at two different levels: 115 volts and 230 volts. Although there may be slight variations in the exact level, every nation employs one of these two wall voltages. For example, the United States and Canada use 115-volt wall sources. European countries, on the other hand, use 230-volt wall sources. Before you operate your equipment, you must ensure that it supports your nation's wall voltage.

Some of the devices in your workstation are equipped with internal power sources. Devices that fall into this category include your processor unit, most power supplies, certain monitors, and certain peripherals. Some of these devices automatically select the correct voltage, others are specifically designed for either 115- or 230-volt operation, and still others provide a Voltage Select switch. Those that include a Voltage Select switch (your processor unit, for example) allow you to set the device for 115- or 230-volt operation.

Before you attempt to connect power to your workstation, make sure that your equipment is compatible with your nation's power standard. For devices that feature a Voltage Select switch, locate this switch and **ensure** that it is correctly set. Complete the following procedure to verify and set your voltage parameters.

CAUTION

If you do not set the Voltage Select switches correctly, you can damage your equipment. Some sites do not use the same wall voltage that the country uses, so be sure to check with your facilities engineer to determine your true wall voltage.

1. Locate the Voltage Select switch on your processor unit. This switch is on the rear of the unit (see Figure 2–15).
2. Move the switch up or down until the correct voltage is displayed.
3. If your workstation includes power supplies, complete these steps:
   a. Locate the Voltage Select switch on your first power supply. This switch is near the cable receptacles (see Figure 2–15).

      Note: *Some power supplies have a label over the switch. Pull the label away from the supply and set the switch as appropriate.*

   b. Move the switch up or down until the correct voltage is displayed.
   c. Repeat step 3b for each of the remaining power supplies.

4. Once you have set all power supplies, inspect your monitor and peripherals. Perform one of the following procedures as appropriate:
   - If the device has a Voltage Select switch, set the switch to match your wall voltage.
   - If the device does not have a Voltage Select switch, check the exterior for any labels indicating that the unit requires a specific wall voltage.
     - Devices that do not have a label automatically select the correct voltage. You need not alter these devices in any way.
     - Devices that have a label can only operate at the listed voltage. Make sure that the voltage on the label matches your wall voltage.

CAUTION

If the voltage on the label does not match the wall voltage, do **not** plug in or power up the device.

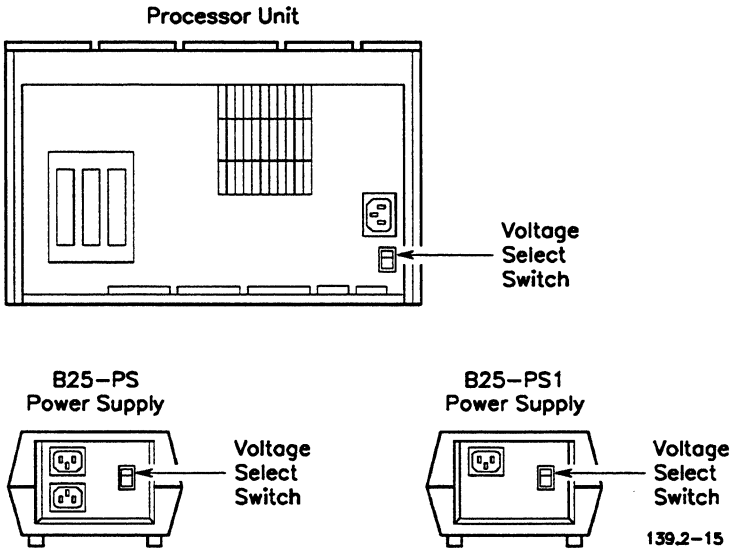


Figure 2–15. Voltage Select Switch Location

Power Supplies and How to Connect Them

Each B39 processor unit incorporates an internal power supply that services its circuitry. If your monitor is directly connected to your processor unit (no graphics module), the internal power supply also supports your graphics controller X-Bus card and monitor. Because it includes an internal power supply, your processor unit does not need an external power supply; you can connect it directly to your wall outlet.

Each module that you attach requires extra power not provided through the B39 internal supply. As you add modules to your workstation, you must connect power supplies to service the modules. The B2X/B3X product line offers two types of power supplies:

- **B25-PS** – These power supplies have a power code of 10. They typically support between two and five modules.
- **B25-PS1** – These power supplies have a power code of 15. Because its power code is higher, the B25-PS1 can support more modules than the B25-PS.

You connect power supplies to the power receptacles at the rear of your module string. To reduce the number of wall outlets required for large workstations, you can also connect two power supplies together, creating a daisy chain.

The following paragraphs explain how to connect your power supplies. As you install the power supplies, keep these important considerations in mind:

- If you place your power supplies on the floor, make sure that they are well away from foot traffic.
- Do **not** stack your power supplies.
- You can only daisy chain B25-PS power supplies.
- Do **not** daisy chain more than two power supplies. If you have more than two supplies, you must use a second outlet for the third supply.

Connecting Your Power Supplies to Your Workstation

In Section 1, you learned how to approximate the number of power supplies your workstation will need. Now you will learn how which modules should receive power supplies and how to attach the supplies to your workstation. In performing these tasks, you need to consider three factors:

- The power code of your power supplies
- The power code of each module
- How the modules are arranged

The following procedure tells you how to attach the power supplies to your workstation. Because a single power supply generally services more than one module, you will find that you attach a power supply to a module, skip a few modules, attach another power supply, skip a few more modules, and so forth.

While you perform these steps, study the example in Figure 2–16; this figure will help you determine where to attach your power supplies. When you finish the procedure, check your work to make sure you connected the power supplies to the correct modules.

Note: *Do **not** connect the ac line cable yet. You will complete this connection when you reach Section 3.*

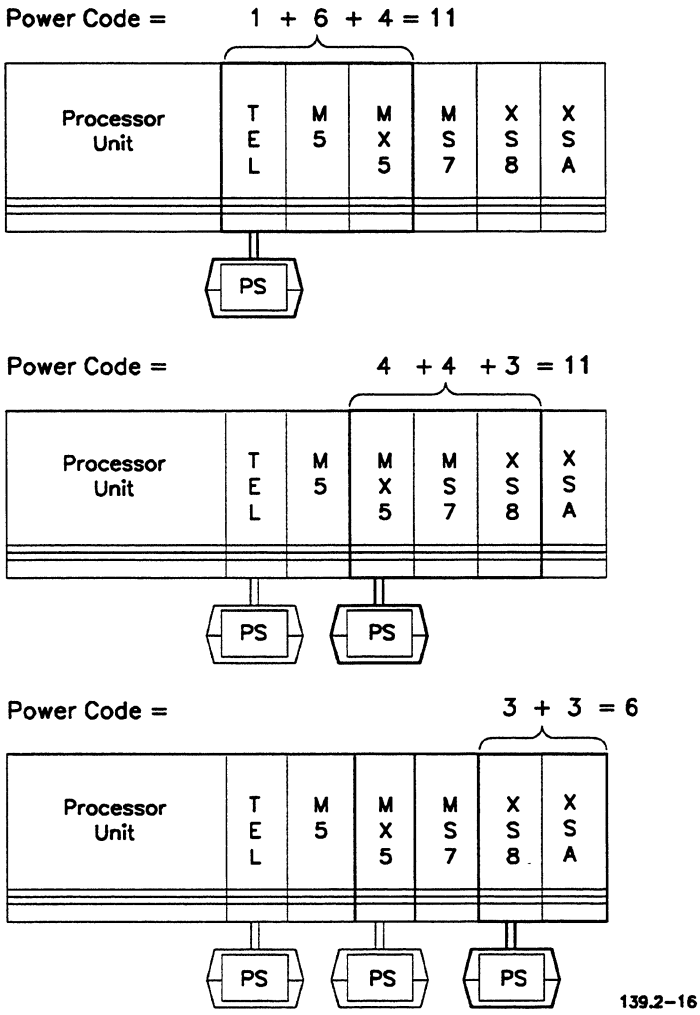
1. If your workstation is already operational and you are simply adding power supplies, complete the following steps:
   a. Turn off the Power switch on the front of the processor unit. Unplug the processor unit from the wall outlet.
   b. Unplug the power supplies from the wall outlets and module string.
2. Locate the two cables that arrived with your first power supply. Select the longer of the two (this cable is a flat cable).

3. Plug one end of the cable into the power supply, as shown in Figure 2–17. Make sure the connector clicks into place.
4. Repeat steps 2 and 3 for each of the remaining power supplies.
5. Facing the rear of your module string, locate the power code label on each module. If a module does not include a power code label, see Table 1–3 for the power code.
6. If any module has a cable cover, remove it; see Table 2–2 to find out which modules have cable covers.
7. Select your first power supply. Plug the free end of the power supply cable into the Power receptacle for the module next to your processor unit.
8. Working from this module toward the end of the string, add the power code of the first module to the power code of the next until the sum is greater than 10 (15 for B25-PS1 power supplies). See Figure 2–16 for an example.

   Note: *For graphics modules, make sure to add the monitor power code to the module power code. Do* ***not*** *include the monitor power code if the monitor is connected to an X-Bus card.*

9. When the sum exceeds 10 (15 for B25-PS1 power supplies), plug the cable for the next power supply into the module that caused the sum to exceed the limit.

   Note: *If the module is a B25-DCX, plug the power supply into the module immediately before it. Use the module with the power supply as the starting point for step 10.*



Note: The B25 prefix is omitted from the module names for clarity

Figure 2–16. Power Supply Placement

10. Starting with this module, repeat steps 8 and 9. Do **not** carry partial power codes over from the previous module group or borrow from the next group. In other words:
    - Each time you attach a power supply, begin your calculations from 0.
    - Use the **full** value of the power code for each module.
11. When you reach the last module in the string, replace all cable covers.

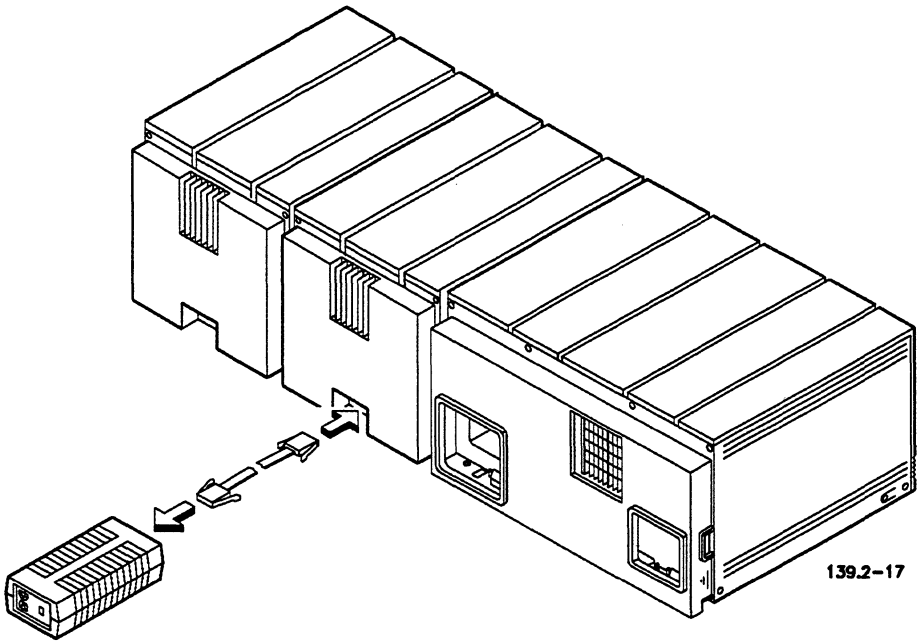


Figure 2–17. Connecting a Power Supply to Your Workstation

Connecting Two Power Supplies Together

To reduce the number of wall outlets required for large workstations, you can connect two B25-PS power supplies together, creating a daisy chain. Here are the instructions for daisy-chaining your power supplies.

Note: *Remember, you cannot daisy-chain B25-PS1 power supplies.*

1. If your workstation is already operational and you are simply adding power supplies, ensure that the processor unit is turned off and unplugged. Disconnect all power supplies from both the wall and the module string.
2. Locate the cables you had left after you connected your power supplies to your workstation. These should all be round cables; they should be shorter than the ones you used in the last procedure.
3. Plug one end of the cable into the first power supply, as shown in Figure 2–18. Plug the other end into the second power supply.
4. If you have a third and fourth power supply, connect these two supplies together as described in step 3.

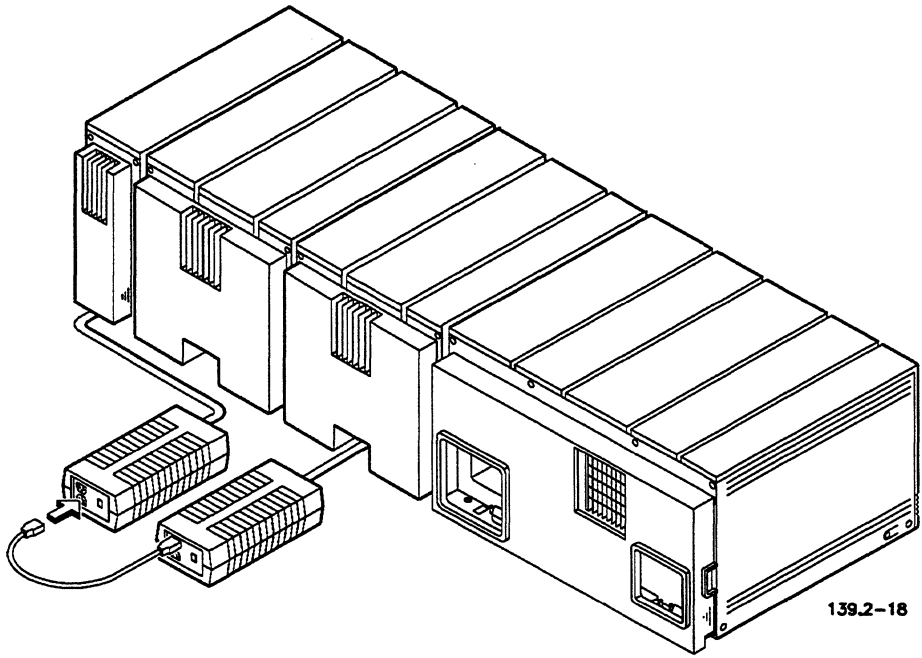


Figure 2–18. Connecting Two Power Supplies Together

Where to Go From Here

You have now finished installing your equipment and setting up your power system. Here is a list of things you have accomplished:

- You have unpacked and inspected your equipment.
- You have installed your processor unit and module string.
- You have cabled your monitor, peripherals, and keyboard to your workstation.
- You have verified that the voltage parameters for your equipment are correctly set.
- You have attached your power supplies.

If you have not completed these tasks, take some time to do so now. When you are ready, turn to Section 3 to learn about starting your equipment, attaching your workstation to a cluster or network, and inserting your media.

Section 3
B39 Workstation Startup

Section 3 tells you how to start your B39 workstation. Keep this section at your side when you turn on your equipment. Before you continue, take a moment to make sure that you have secured all caps and module cable covers, tightened all peripheral connector screws, and observed all workstation clearances. If you are adding your workstation to a cluster, leave the cable cover off the rear of your processor unit for the time being. Here are some of the topics covered in Section 3:

- Workstation controls and indicators
- Workstation startup procedures
  - Workstation preparation
  - Connecting the workstation to a power source
  - Turning on the power
  - Connecting the workstation to a cluster
  - Connecting the workstation to a LAN
  - Connecting the workstation to an ISDN network
- Software installation

Workstation Controls and Indicators

Your workstation features several controls and indicators that let you manage system functions and keep track of device status. For the B39 product line, controls and indicators take the following form:

- **Controls** – Workstation controls usually take the form of switches. You use the controls to turn on your equipment, boot your software, adjust the brightness of your screen, and so forth.
- **Indicators** – Workstation indicators typically take the form of LEDs (light emitting diodes). The indicators provide you with information on whether a device is turned on or actively executing a task.

Before you turn on your workstation, read the following paragraphs to learn about the purpose and location of your controls and indicators.

Processor Unit

B39 processor units are equipped with a variety of controls and indicators. Here is a description of each one:

Power switch This switch turns on your processor unit and module string. The Power switch is labeled with an I (On position) and O (Off position). This switch is located on the front cover, as shown in Figure 3–1.

Reset switch This push-button switch reboots your workstation. When you press the Reset switch, your workstation loads the operating system and executes various diagnostic tests. Figure 3–1 shows the location of the Reset switch. For a brief discussion of the rebooting process, turn to the end of this section.

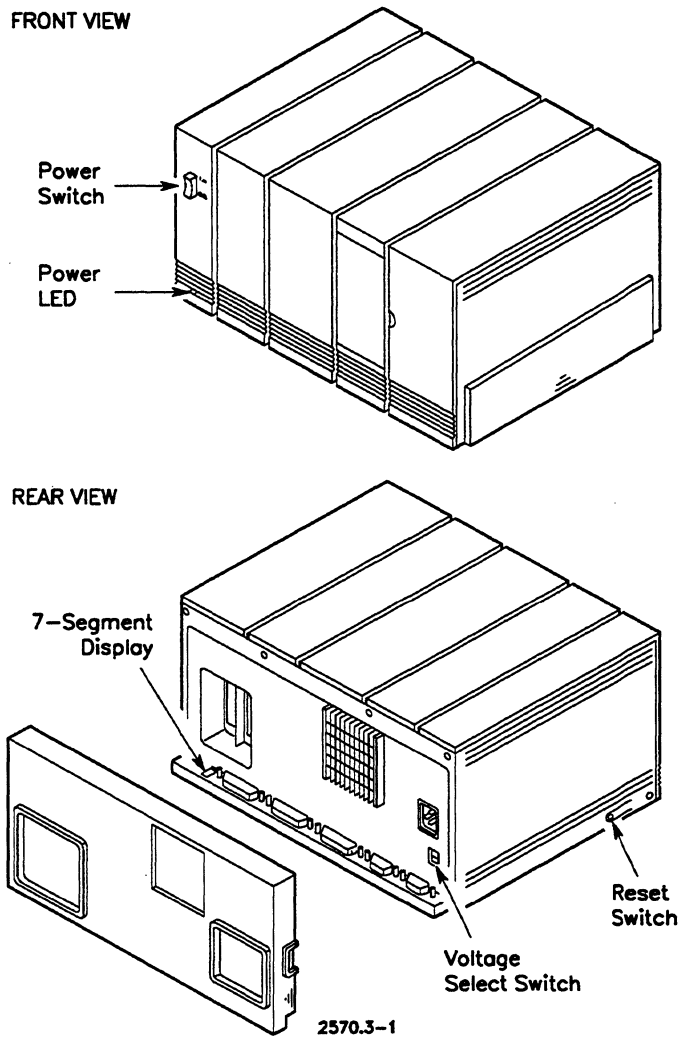


Figure 3–1. Switch and Indicator Location

Voltage Select switch	This switch allows you to configure your workstation for domestic or international power. The Voltage Select switch is located at the rear of the unit. United States and Canadian sites typically set the switch to 115. Most international installations set the switch to 230.
Power LED	This indicator lights when the workstation is turned on. The Power LED is located on the front cover.
7-segment display	This display reports workstation status. The 7-segment display can also be custom-programmed. This display is located at the rear of the cabinet. For a complete description of the 7-segment display, see the status code discussion in the "Troubleshooting" section of the *CTOS Workstations Planning and Owner's Maintenance Guide.*

Modules

Because workstation powering and booting are initiated from the processor unit, most modules do not include control mechanisms such as switches. However, your modules provide you with various indicators that tell you whether the module is powered up and actively processing. These indicators are discussed below.

Power LED — This indicator lights when the module is receiving power. The Power LED is located on the front cover of every module. For modules with more than one LED, the Power LED is the leftmost LED. If you turn on your workstation and the Power LED on one of your modules does not light, you may have a loose connection.

Note: *X-Bus hard disk expansions do not use their Power LEDs.*

Activity LEDs — These indicators light when a function is actively processing. The only modules that have Activity LEDs are disk, tape, and CD-ROM modules. Activity LEDs are located on the right-hand segments of the module and reflect the activity level in that segment. For instance, in a floppy/hard disk module, the LED on the floppy disk segment reflects floppy disk drive activities whereas the LED on the hard disk segment reflects hard disk drive activities.

7-segment display — This display reports workstation status. The 7-segment display can also be custom-programmed. You will find this display on SCSI floppy/hard disk upgrade modules only; it is located on the rear of the module.

Peripherals

Virtually all peripherals provide a set of controls and indicators for your use. These controls and indicators vary depending on the function and nature of the equipment. For instance, monitor controls let you adjust screen brightness and contrast, whereas printer controls allow you to feed paper through the print mechanism. The following paragraphs discuss controls and indicators for some of the more common peripherals.

Monitors

Most monitors are similar to each other in terms of the controls and indicators they provide. If you are not familiar with monitors, here is a description of the typical controls and indicators.

Note: *Do not be concerned if your monitor has only a few of the controls and indicators listed below. Some of the controls are for color monitors only. Also, your controls and indicators may be located at the rear or front of your monitor.*

Power switch	This switch turns on your monitor. The Power switch is labeled with an I (On position) and O (Off position).
Brightness control	This knob adjusts the brightness of your screen. To prevent screen burn, adjust the brightness so that the characters are easy to read and you do not see any background lines.
Contrast control	This knob adjusts your screen contrast. The greater the contrast, the greater the difference between light and dark areas on your screen.
Degauss switch	This push-button switch demagnetizes a color monitor's screen. If your screen colors become uneven, pressing the degauss switch can help. Some color monitors do not include degauss switches; these monitors degauss the screen automatically when you turn them on.
Voltage Select switch	This switch allows you to configure your monitor for domestic or international power. Most United States and Canadian sites use a setting of 115. International installations usually set the switch to 230.
Power LED	This indicator lights when the monitor is turned on.

Keyboards

Your keyboard features several indicators. These indicators fall into two categories: keypad LEDs and special-purpose LEDs.

Keypad LEDs

These LEDs are located on the top surface of the **OVERTYPE, LOCK, F1, F2, F3, F8, F9**, and **F10** keys. Keypad LEDs report workstation status codes during system startup and rebooting. However, the **LOCK** and **OVERTYPE LEDs** also light when you activate those two functions. Also, certain applications use some of the keyboard LEDs for special functions. If you need more information on keypad LEDs, see the "Troubleshooting" section of the *Planning and Owner's Maintenance Guide.*

Note: *B25-K4 keyboards have no keypad LEDs.*

Special-Purpose LEDs

These LEDs are available for B25-K3, B25-K4, B25-K5, and SG-101-K keyboards only. On B25-K3, B25-K5, and SG-101-K keyboards, the LEDs report communications activities, perform specially programmed functions, and so on. If you have a B25-K4 keyboard, you can program these LEDs to light when you press particular keys. The exact use of the LEDs depends on how your system is designed and what application you are executing.

On B25-K3, B25-K5, and SG-101-K keyboards, the special-purpose LEDs are located at the upper right of the keyboard. For B25-K4 keyboards, these LEDs lie between the upper and lower keypad groups.

Other Peripherals

Because the range of remaining peripherals is such a broad one, specific discussions of peripheral controls and indicators are not included in this guide. If you need information on a peripheral device, refer to the appropriate hardware description for that device. For questions about printer controls and indicators, refer to the *CTOS Generic Print System Administration Guide* instead.

Workstation Startup Procedures

Starting your workstation is a straightforward task. If you performed your installation correctly, your startup should be trouble-free. Once you complete the following procedures, you will be ready to install your system software.

Workstation Preparation

Before you start your workstation, you need to complete a preliminary procedure. Each 5.25-inch floppy disk drive in your workstation (including the one inside your B39) arrives with a drive-protect card in the floppy disk slot. This card protects the magnetic heads from shipping damage. You should remove the drive-protect card before you turn on your workstation. To remove the drive-protect card:

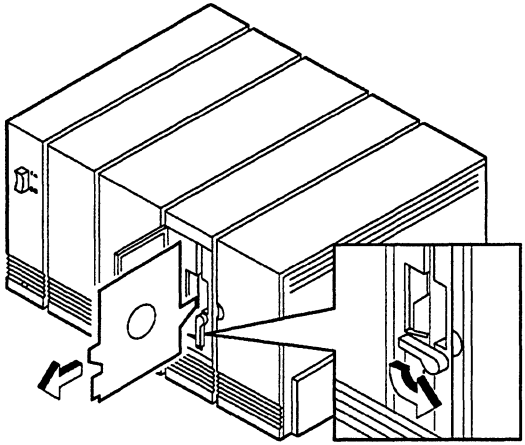
Note: *There are two types of 5.25-inch floppy disk drives. One has a lever that you turn upward to lock the floppy disk in place. The other has a latch that you push.*

1. If the module has a door, open it.
2. Turn the lever counter clockwise or press the left side of the latch inward (see Figure 3–2). Do **not** use excessive force.

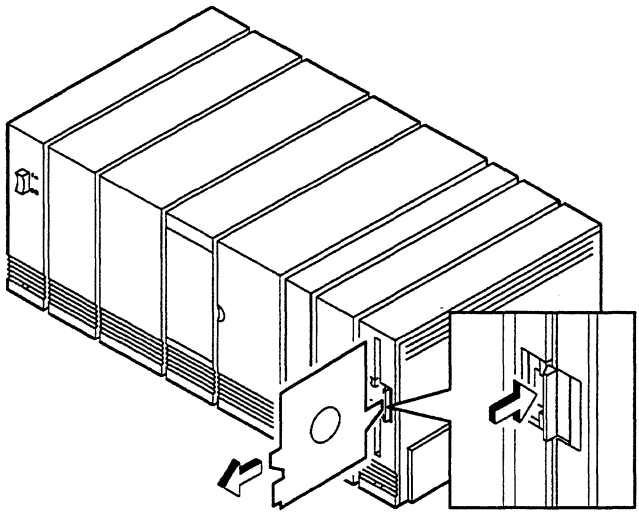
   Note: *If the drive does not contain a drive-protect card, the lever will not move.*

3. Remove the drive-protect card. If the module has a door, close it.

FLOPPY DRIVE WITH LEVER



FLOPPY DRIVE WITH LATCH



2570.3-2

Figure 3–2. Removing the Drive-Protect Card

Connecting Your Workstation to a Power Source

Before you turn on your equipment, you must connect the processor unit, power supplies, and various other workstation components to the electrical outlets in your office or computer center. To plug in your workstation, perform these steps:

1. Take an inventory of each piece of equipment that needs an ac line cable. Make sure you have cables for all of the equipment. Here is a list of devices that require ac line cables:
   - Processor units
   - B25-PS power supplies (unless daisy chained to another power supply that has an ac connection)
   - B25-PS1 power supplies
   - B25-CA1 monitors
   - B25-CD3 monitors
   - B25-D3 monitors
   - B25-GS1 monitors
   - B25-VDC monitors
   - B25-VDM monitors
   - SG-102-D monitors
   - VGA-200-MON monitors
   - VGA-931-VDM monitors
   - Off-the-shelf VGA monitors
   - Printers, optical character recognition readers, and so forth
2. Locate the Power switches on your processor unit, monitor, and any other peripheral that has one. Make sure that these switches are all in the off (O) position.

   Note: *Not all monitors have power switches.*
3. Select the ac line cable for your processor unit. Route the cable through the cover cutout (see Figure 3–3) and attach it to the ac receptacle at the rear of your processor unit.

4. Attach the other end of the cable to a wall outlet. Make sure that you route the cable so that no one will trip on it.
5. For each power supply, attach an ac line cable to the ac receptacle in the power supply.
6. Attach the other end of the cable to a wall outlet. Make sure that you route the cable so that no one will trip on it.
7. Check the list provided in step 1. If you have any of the peripherals on the list, attach one end of the ac line cable to the ac receptacle in the device.

   Note: *Make sure that you have the right ac line cable for the device.*
8. Attach the other end of the cable to a wall outlet.

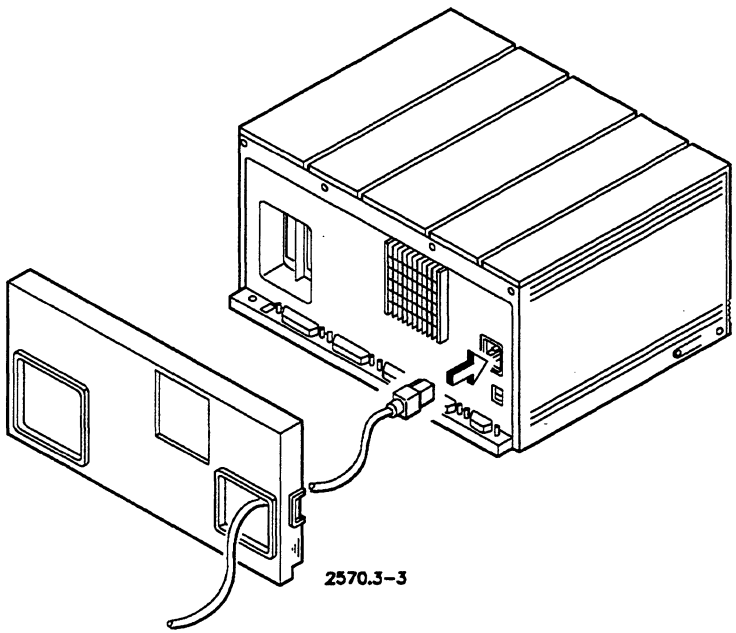


Figure 3–3. Processor Unit AC Line Cable Routing

Turning on Your Workstation

To turn on your workstation, complete the following steps:

1. If your monitor has a Power switch, turn it on.
2. Turn on the processor unit Power switch.
3. Turn on the Power switches for any other peripherals.

When your workstation receives power, the LEDs on the processor unit and modules light, the disks start rotating, and the fans begin spinning. Your monitor should also show some sort of activity. When your workstation's power-up sequence is complete, the activity LEDs on your modules turn off.

If your workstation does not power up correctly, here are some steps you can try. You can also refer to Section 4 for more information on the startup sequence and troubleshooting.

- If your monitor remains blank, adjust the brightness control knob.
- If your monitor remains blank, none of the LEDs light, and you do not hear the fans:
    1. Turn off all workstation Power switches. Unplug the processor unit and power supplies from the wall.
    2. Check both ends of each connection to make sure the plugs are firmly seated. Grasp both ends of the module string and squeeze the string together. This action reseats loose power connections.
    3. Plug the processor unit and power supplies into the wall. Turn on all workstation Power switches in the order described above.

- If the Power LED on any of your modules does not light, complete the following steps. Remember, X-Bus hard disk expansion modules do not use their Power LEDs; these LEDs should never light.

  1. Squeeze the module string to reseat the loose connection.
  2. If the LED still does not light, turn the workstation off. Unplug both ends of the processor and each power supply. Take the module string apart and put it together again. Reconnect and restart the workstation.

     Note: *On some modules, LEDs can light even when you have a poor connection. If you suspect a bad connection, install your standard software, enter the Executive, and issue the Display Configuration command. See your* CTOS Executive Reference Manual *for more information.*

  3. If these measures do not fix the problem, your processor unit may be faulty.

- B39 processor units include an Activity LED beneath the floppy disk drive. If this LED flashes repeatedly, check the 7-segment display at the rear of the unit for the status code (see the "Troubleshooting" section in the *Planning and Owner's Maintenance Guide*).

Connecting Your Workstation to a Cluster

Once you power up your equipment and it successfully completes its startup sequence (see Section 4), you can connect your workstation to a cluster. There are two types of clusters: TeleCluster configurations and RS-422/485 configurations. TeleCluster cabling procedures differ from RS-422/485 cabling procedures. The following paragraphs tell you how to attach your workstation to the two types of clusters. Always turn off and unplug your workstation for this procedure.

TeleCluster Configurations

When you connect your workstation to a TeleCluster configuration, you install a TeleCluster adapter that links your equipment to a TeleCluster hub via twisted-pair cables installed in your building. In a TeleCluster configuration, the hub acts as the communications center for each of the TeleCluster workstations. To connect your workstation to a TeleCluster configuration, complete the following procedures. For more information on TeleCluster configurations and cables, see the *CTOS Cluster and Network Hardware Installation Guide.*

Note: *The following instructions apply to TeleCluster adapters currently being shipped. Your system may use an older version of the adapter that provides voice-over-data functions. For this type of adapter, see the* BTOS TeleCluster Planning, Installation, and Operations Guide. *If you are not sure which type of TeleCluster adapter you have, see Figure 2–13.*

1. Turn off the Power switch on the front of the processor unit. Unplug the processor unit from the wall outlet.
2. Unplug the power supplies from the wall outlets and module string.
3. If you have not already done so, remove the cable cover from the rear of your processor unit. Note the position of the two Cluster receptacles.
4. Plug the TeleCluster adapter into either of the Cluster receptacles (see Figure 3–4). Secure the adapter by tightening the two connector screws.
5. Route the adapter cable through the cover cutout and plug the cable into the TeleCluster wall jack.
6. Reconnect workstation power supplies. Turn on the Power switch at the front of your processor unit.
7. Observe the LED on the TeleCluster adapter and make sure that it lights. If the LED does not light, reseat the adapter.
8. Replace the processor unit cable cover.

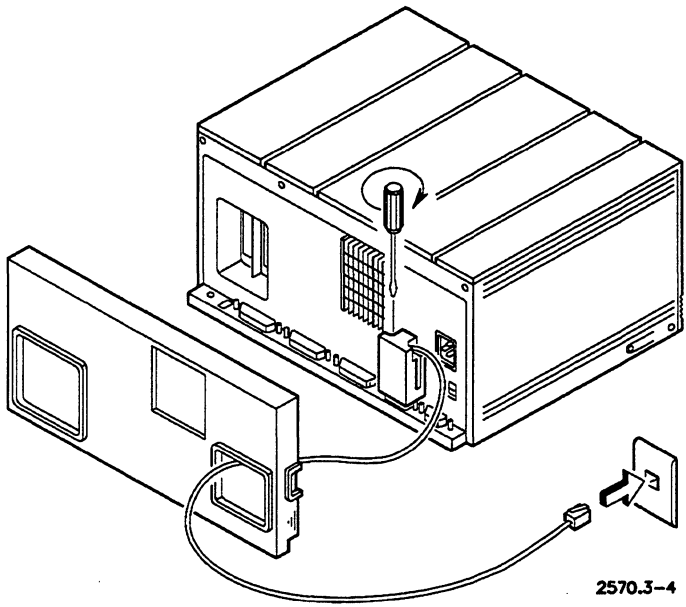


Figure 3–4. Connecting a TeleCluster Adapter to Your Processor Unit

RS-422/485 Configurations

To connect an RS-422/485 cluster, perform these procedures. Because of electrical differences within a cluster, we recommend that you turn off all other cluster workstations when you attach your system to the cluster. For more information on RS-422/485 clusters, see the *CTOS Cluster and Network Hardware Installation Guide.*

1. Inform all other cluster users that you are disabling the cluster. Turn off each workstation in the cluster.
2. Turn off the Power switch on the front of the processor unit. Unplug the processor unit from the wall outlet.
3. Unplug the power supplies from the wall outlets and module string.
4. If you have not already done so, remove the cable cover from the rear of your processor unit. Note the position of the two Cluster receptacles.
5. Study Figure 3–5. Determine which of the two RS-422/485 cluster configurations is closest to yours. Familiarize yourself with the position of your workstation within the cluster.

   Notes:

   - *In the figure, the B39 processor unit is shown as the server; B39s can also be cluster workstations.*
   - *If your workstation is the first or last one in the cluster, make sure you have the correct terminator.*
6. Locate the free end of your RS-422/485 cluster cable. Route the RS-422/485 cable through the cover cutout.
7. Plug this cable into either of the Cluster receptacles (see Figure 3–4 for the location). Secure the cable by tightening the two connector screws.
8. If your workstation is **not** the first or last one in the cluster, repeat steps 6 and 7 for the other RS-422/485 cluster cable.
9. If your workstation is the first or last one in the cluster, install a cluster terminator in the other Cluster receptacle and secure it by tightening the two connector screws.

10. Replace the cable cover. Unless you are planning to connect to a network, reconnect workstation power and turn on the Power switch at the front of your processor unit.
11. Power up all the cluster workstations disabled in step 1.

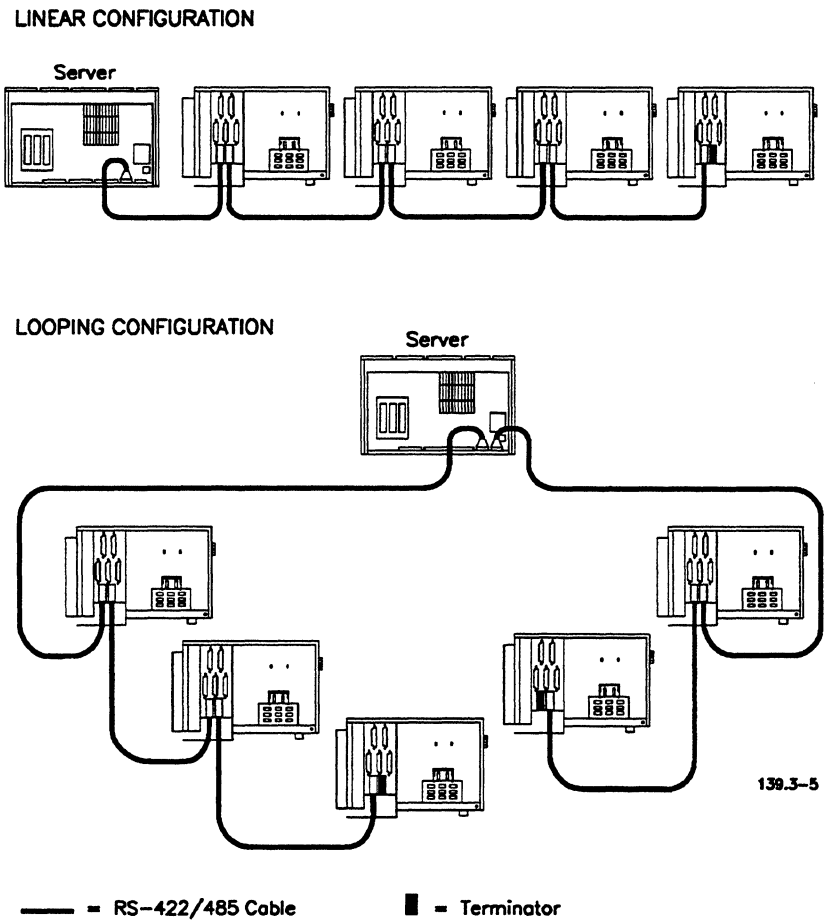


Figure 3–5. RS-422/485 Cabling Configurations

Connecting Your Workstation to a Local Area Network

If the workstation you are installing is a server, you can attach it to a local area network (LAN). The following discussion covers two types of LANs: Ethernet and token ring. Ethernet LANs are attached to your server through your B25-EN3 module. You attach token ring LANs through B25-TR2 modules.

When you add a server to a LAN, consider these points:

- Before you attach the server to a LAN, you should be able to power up your cluster without generating any errors.
- Your configuration may include either or both types of LAN modules.
- Because of electrical differences within a LAN, we recommend that you turn off all other LAN servers when you attach your server.

To connect your server to an Ethernet and/or token ring LAN, complete the following steps. For more information on LANs, see the *CTOS Cluster and Network Hardware Installation Guide.*

1. If your server is active, inform all cluster users that you are disabling the cluster.
2. Turn off the Power switch on the front of the processor unit. Unplug the processor unit from the wall outlet.
3. Unplug the power supplies from the wall outlets and module string.
4. Make sure that all other LAN servers are turned off.
5. Locate the free end of your LAN cable.

   Note: *If your workstation includes both an Ethernet and token ring LAN, make sure you have the correct LAN cable for the module you are working on.*

6. Plug this cable into the LAN receptacle at the rear of your LAN module (see Figure 3–6 for the location). Secure the cable by tightening the two connector screws.

7. If you have other LAN modules, repeat steps 5 and 6 for these modules.
8. Inform the other LAN servers that the installation is complete.
9. Reconnect workstation power and turn on the Power switch at the front of the processor unit.
10. Inform all cluster users that the server is now active.

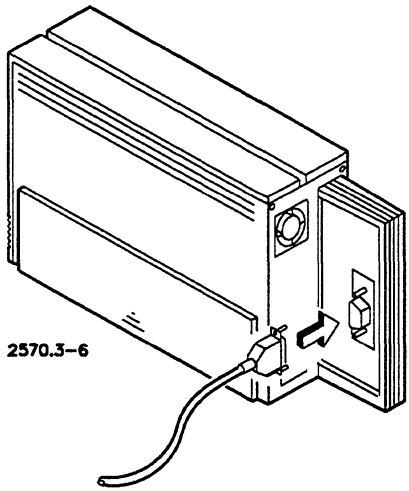


Figure 3–6. LAN Cabling

Connecting Your Workstation to an ISDN Network

Once you power up your cluster without generating any errors, you can connect your workstation to an ISDN network through your B25-DN1 X-Bus card or B25-DN2 module. Before you start, be sure that you have an ISDN/ST cable; depending on how the ISDN network was installed for your facility, you may also need an ISDN network termination unit. You can order the cable and network termination unit through various commercial distributors.

To connect your workstation to the network, perform the following steps. For more information on ISDN networks and cabling, see the *CTOS Cluster and Network Hardware Installation Guide*.

Note: *The following procedure explains how to connect your workstation to the network; it does not tell you how to install a network termination unit. To learn about network termination units, see the* CTOS Cluster and Network Hardware Installation Guide.

1. If the workstation you are connecting to the network is a server, inform all cluster users that you are disabling the cluster.
2. Turn off the Power switch on the front of the processor unit. Unplug the processor unit from the wall outlet.
3. Unplug the power supplies from the wall outlets and module string.
4. Plug one end of the ISDN/ST cable into the RJ45 jack on the B25-DN1 X-Bus card or the B25-DN2 module (see Figure 3–7).

   Note: *If you want to remove the cable at a later time, be sure to depress the connector tab (see Figure 3–7) before pulling the connector free of the jack. You may need a screwdriver to properly depress the tab.*
5. Plug the other end of the cable into the ISDN wall jack.
6. If you are attaching the workstation to multiple ISDN networks, repeat steps 4 and 5 for these networks.
7. Reconnect workstation power and turn on the Power switch at the front of the processor unit.
8. Inform all cluster users that the server is now active.

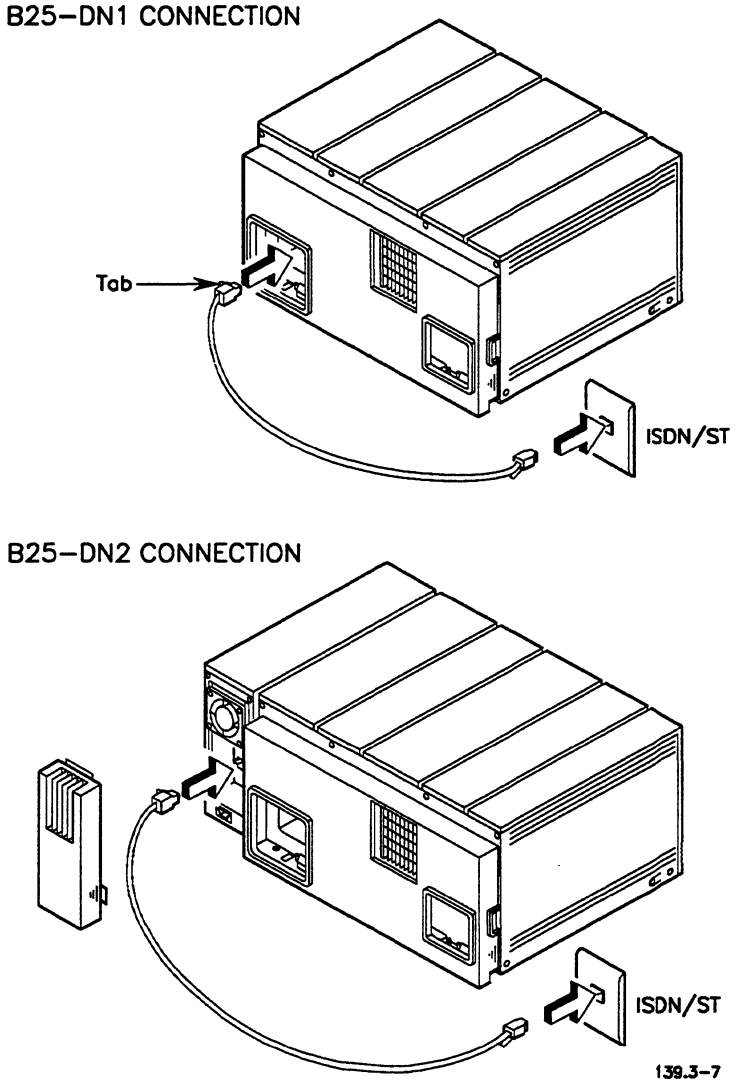


Figure 3–7. Connecting Your Workstation to an ISDN Network

Software Installation

Once your equipment is operating, you can install your software. The way you do this depends on what type of software you ordered. Because there are so many variations, this guide does not explain how to install your software. However, to give you an idea of what is involved, here is a brief overview of workstation software and the steps you must complete.

Workstation Software

Your workstation uses three types of software: the operating system, system services, and application programs.

- *Operating system* – This program controls the functions of your workstation and all other system software.
- *System services* – These programs support the function of various modules or applications programs. For example, the Generic Print System incorporates several system services that allow you to print files created under applications like the OFIS Document Designer and OFIS Graphics programs.
- *Application programs* – These programs perform specific tasks such as office publishing (OFIS Document Designer) or graphics design (OFIS Graphics). You interact directly with these programs.

Installing Software

Even though it is a straightforward task, software installation can be lengthy, often taking up to two hours. Here are a few pointers:

- Always install your operating system and system services before you install your applications programs.
- Make sure you fully configure the software package you are currently installing before continuing to the next software package in the sequence.

Your software package contains diskettes and installation instructions. When you install the package, your workstation loads the software into a permanent location. For more information on software, see the *CTOS System Software Installation Planning Guide.*

Rebooting Your Workstation

As you install your software, you may have to reboot your workstation. When you *reboot* your workstation, you force it to run its bootstrap program, a program that locates and loads the correct operating system for your workstation. Bootstrap programs include diagnostic tests that verify the function of the workstation.

If Your Workstation is Active

When you boot your workstation, the bootstrap program interrupts the application you are currently executing. Because of this, you should always exit your application before you start a boot run. This measure helps prevent data loss during the boot process.

If You Need to Reboot the Server

If you are rebooting a server, consider the other users in the cluster. These users may be running programs that access the server's disks. Since initiating a boot run can sometimes result in data loss for currently active files, **always** inform all cluster users before you boot the server and ask them to release server resources.

How to Reboot Your Workstation

For your convenience, the following paragraphs describe how to boot your workstation. You may find this procedure helpful while troubleshooting your equipment. You can refer to the *CTOS Workstations Planning and Owner's Maintenance Guide* and the *CTOS System Administration Guide* for detailed information on bootstrap programs.

CAUTION

In some cases, cluster workstations boot from the server's hard disk rather than their own. After a boot from the server's hard disk, the workstation will be pathed to the server's hard disk instead of its own. Its directory will now appear to include many files that were not there before. If you find yourself in this situation, do **not** delete these files or you will destroy server resources. Simply issue the Path command and specify your own directory.

1. Press the Reset switch on the left side of your processor unit (see Figure 3–1 for the location).
2. If the boot run generates any status codes, complete these steps:
   a. Look up the status code in the *CTOS Status Codes Reference Manual* and take the action indicated. If the status code description instructs you to dismantle a device or access any internal components, contact your service representative. Do **not** try to perform the repair yourself.
   b. Reboot the workstation. If your workstation issues the status code again, contact your service representative.
3. When the boot run finishes successfully, your screen displays your signon message or other appropriate information.

Where to Go From Here

You have now started your workstation and attached it to a cluster and/or network. Here is a list of things you have accomplished:

- You have learned how to use your workstation controls. You have also learned the purpose of your workstation indicators.
- You have removed the drive-protect card from all of your floppy disk drives.
- You have attached your equipment to an ac power source.
- You have turned on your workstation and attached it to a cluster, LAN, and/or ISDN network.
- You have read about booting your workstation.

If you had any problems that you were unable to solve, turn to Section 4 for a discussion of troubleshooting.

Section 4
B39 Workstation Troubleshooting

This section discusses some of the problems you can experience during hardware installation. Section 4 also tells you how to solve these problems using a process called *troubleshooting*. When you troubleshoot your workstation, you observe the way your equipment behaves and collect all pertinent data on the failure (error reports and so forth). You then eliminate the possible causes of the problem, one by one.

Section 4 focuses on the most common installation failures. If your workstation experiences a failure not described in this section, you may need to place a service call. This section reviews the following subjects:

- How to solve workstation failures
  - Typical workstation startup
  - Preliminary checks
  - Common problems
- Status codes
  - Display methods
  - What to do about status codes
- Other diagnostic tools

Solving Workstation Failures

Your workstation is designed for simple, trouble-free installation. As a rule, your first attempt to power up your equipment will be a successful one. However, workstations occasionally suffer from loose connections and other easily remedied problems when they are first installed.

If your workstation develops a problem when you first turn it on, do not be alarmed. Fixing a workstation can be as easy as reseating a loose connector. As you think about the problem, keep in mind that your best tools are common sense and deductive reasoning.

Your workstation follows a prespecified routine each time you turn it on. Variations from this routine indicate that your workstation may have a problem. The following paragraphs guide you through a typical startup sequence and explain what to do if your workstation does not power up in a normal manner.

Typical Workstation Startup

In Section 3, we briefly reviewed what happens when you turn on your workstation. This set of activities is known as a *startup sequence.* Your workstation must complete each action in this sequence before you can consider it operational. To give you an idea of how your workstation behaves when you turn it on, here is an overview of the startup sequence.

1. Your workstation receives power. The following activities occur almost simultaneously:
   a. Your workstation lights its LEDs.
   b. The fans on your processor unit and modules begin to spin.
   c. Your disk drives start spinning.
2. Your workstation initiates bootstrap ROM testing. Bootstrap ROM tests confirm that various internal components are operating properly.

   Note: *Your keyboard LEDs flash once at the beginning of the test set and once at the end.*

3. Your video functions begin, and your monitor shows signs of activity. You should see the following display:

```
T
**********
```

4. If your operating system is already installed, your workstation performs these activities:

   a. The workstation loads the operating system from the appropriate device (usually a disk or server) and issues a version of the following display:

```
L
.....................................................
.....................................................
```

   b. The operating system begins to execute and perform tests against the hardware.

      Note: *Your keyboard LEDs flash once as the operating system is initialized.*

   c. Your monitor screen goes blank as the operating system initializes its video functions.

   d. System initialization begins, and the operating system version is displayed.

   e. The workstation displays its signon screen.

When a workstation experiences problems during startup, it either halts the sequence or generates a status code to indicate that an error has occurred. The following paragraphs discuss some of the actions you can take to resolve an installation problem. For an introduction to status codes, their purpose, and how they are displayed, see the paragraph entitled "Status Codes," later in this section.

Preliminary Checks

Many workstation faults are the result of poor electrical connections. If your workstation develops problems, here are some steps that may help solve them. You should perform these steps before you initiate diagnostic testing.

- Make sure that all power supply connectors are firmly seated. These connectors sometimes loosen if the power supplies are moved. Also, surface vibration can occasionally loosen a connector.
- Observe the LEDs on your processor unit and modules. Give the module string a firm squeeze. If any new LEDs light, there was an incomplete electrical connection somewhere in the string.
- Confirm that all external cables and adapters are firmly connected. Pay special attention to power cables, cluster cables, peripheral cables, TeleCluster adapters, LAN cables, and so forth.

If the problem persists, trace the steps you took to install your workstation. Make sure that you did not omit any of the steps and that you performed each one correctly.

Common Problems

The following discussion provides some pointers on solving problems that typically occur during installation. If the actions described below do not help, contact your service representative.

Nothing happens when I turn on the power.

- Make sure the processor unit and all power supplies are connected to the wall.
- Make sure the processor unit and power supply cables are connected to the workstation.
- Check the seating on any other power cables.

My workstation periodically powers off by itself.

- Check the seating on all power cables.
- If you have an extra power supply, substitute it for each of the workstation power supplies, one by one. Do not replace all the power supplies at once or you will not know which one is faulty. Should the problem persist, call your service representative.

The screen is dark when I turn on the power.

- Check both ends of the monitor cable connection.
- Check the Brightness control on the monitor.

Images on my monitor screen flicker or waver.

- Check the monitor cable connection.
- Ensure that the monitor cable is not damaged.

My monitor screen suddenly goes blank.

- Press any key on the keyboard. If the display reappears, your workstation is set to *time out*, which means the display is set to turn off after a specified period of inactivity. You do not lose any data when the screen turns off. You can turn the screen back on by pressing any key on the keyboard. For more information, see the *CTOS Executive User's Guide.*
- Check the monitor cable connection to make sure that it has not been accidently pulled free.

My monitor screen scrolls uncontrollably or the information on the screen is crooked.

- Call your service representative.

The entire screen is not displayed.

- Enter the Executive, issue the Screen Setup command, and respecify the screen length. If your workstation includes a B25-VG3 or B25-VG4 graphics controller, use a value of 38. For all other workstations, use a value of 29.
- Call your service representative.

When I type on the keyboard, nothing happens on the screen.

- Check the keyboard cable connection.
- Check the monitor cable connection.

When I move my mouse, the cursor on the screen does not move.

- Clean the mouse and check the mouse cable connection.
- Check the monitor cable connection.
- Reboot your workstation and verify that the proper mouse software has been installed (see the *CTOS System Software Installation Planning Guide).*

My workstation does not boot when I turn it on.

- If you are installing operating system software from removable media, make sure the correct media is inserted in the drive.
- For workstations connected to a cluster, go to the server and start the Executive. Issue the Cluster Status command to see if the server recognizes your workstation. If it does not, check the cluster cabling. When cabling has been eliminated as the cause, reboot the server. Remember to alert all cluster users first.

My workstation cannot communicate with the server.

- Boot the server. Remember to alert all cluster users first.
- Make sure all the cluster cables are firmly connected.
- For TeleCluster configurations, make sure the TeleCluster adapter is firmly plugged in. If all the cables are connected and you still cannot access the server, check your office for spare TeleCluster adapters. When you find one, substitute it for your adapter and see if the new adapter solves the problem.
- For TeleCluster configurations, have your system administrator restart the hub.

My workstation cannot communicate with the rest of the LAN network.

- Boot the server. Remember to alert all cluster users first.
- Make sure all the cluster cables are firmly connected.
- Make sure the LAN cables are firmly connected.

Status Codes

Your workstation generates a status code if it encounters an unusual condition. A *status code* is a number that uniquely defines an error and the circumstances surrounding it. Status codes are between one and five digits long. By interpreting the status codes that your workstation produces, you can often identify the source of the error.

Note: *Not all status codes reflect error conditions; some simply indicate that an application is complete.*

How Status Codes Are Displayed

Your workstation reports status codes in different ways depending on which type of error occurred. Here is a description of the various reporting mechanisms.

- **Monitor Screen** – If your workstation video is functioning at the time of the error, status codes are displayed on your monitor screen. With this type of display, the status code is typically accompanied by a message that alerts you to the fact that an error has occurred.
- **Keypad LEDs** – If your workstation has a video problem or has not yet activated its video functions, it cannot use the monitor screen to report the error. In this case, your keyboard LEDs light in a pattern that you convert into a status code.

  Note: *B25-K4 keyboards do not report status codes via their LEDs.*
- **7-Segment Display** – Your workstation also reports status codes via a 7-segment display at the rear of your processor unit. In this case, the display flashes the first digit of the code followed by the second digit. Again, this type of reporting only occurs when your workstation has a video problem or has not yet activated its video function.

What to Do About Status Codes

If your workstation issues a status code, turn to the "Troubleshooting" section in the *CTOS Workstations Planning and Owner's Maintenance Guide*. This discussion provides a more detailed overview of status codes. "Troubleshooting" also tells you how to interpret keyboard LEDs and 7-segment displays. Use the information in this discussion to determine your status code.

Once you determine the status code, look it up in the *CTOS Status Codes Reference Manual*. You will find that many status codes are caused by situations that can be easily remedied. Some codes are the result of poor connections, others are caused by improperly inserted media, and still others are the product of command entry errors. As you review the definition of your status code, perform any of the suggested actions that do not require access to the interior of the equipment. If these actions do not solve the problem, contact your service representative.

WARNING

Do **not** perform procedures that require you to dismantle any device. You may injure yourself or damage the equipment.

Other Diagnostic Tools

At times, you may encounter problems that cannot be solved as just described. In this case, you may need to initiate diagnostic testing. For your convenience, B39 workstations can be tested under Visinostics, a set of diagnostics that analyze the components in your workstation. Visinostics is available on floppy disk. For further information, refer to the *CTOS Visinostics Operations Guide*.

Glossary

A

application program

A software program, such as OFIS Graphics or OFIS Document Designer, that performs a specific task or creates an environment in which a task can be completed.

B

boot

To start a computer by reloading the operating system from a disk or cluster. *See also* reboot.

bootstrap program

A ROM-resident program that contains startup instructions for the system. Bootstrap programs execute each time you power up or reset the workstation. They usually complete a set of tests against various devices in the workstation to ensure proper operation. *See also* reboot.

bus

The circuitry that electronically links the elements of a computer system, transmitting signals from one device to another. *See also* SCSI bus; X-Bus.

C

CD-ROM disk drive

A disk drive that reads a compact disc.

central processor unit (CPU)

The part of a processor unit that controls the interpretation and execution of instructions.

cluster

One or more workstations connected to a server. *See also* cluster workstation; server.

cluster workstation

A workstation that is connected to a server; the cluster workstation uses the server to store some or all of its files and to execute application programs.

compact disc (CD)

An optically encoded disc; compact discs are used with CD-ROM disk drives. *See also* disk.

configuration

The combination of hardware and software elements that constitute a computer system.

connector

A physical device, such as a plug, socket, or jack, used to connect hardware components or cables in a computer system.

core device

A hardware component that is part of every workstation, regardless of the workstation's size. B2X/B3X workstations require three core devices: a processor unit, a monitor, and a keyboard.

CTOS operating system

A realtime, message-based, multitasking operating system.

D

daisy chain

A cluster connection that links computer systems together so that the signals pass from the first system to the second, from the second to the third, and so on.

disk

An information storage medium consisting of a flat, round surface used to store data. The data may be magnetically or optically encoded depending on the type of disk.

disk drive

A device that writes and reads information on the surface of a magnetic disk.

E

Ethernet

The technological base for one type of local area network. *See also* local area network.

F

floppy disk

A magnetically encoded disk that is flexible; floppy disks can be removed from the disk drive. *See also* disk.

floppy disk drive

A disk drive that writes and reads floppy disks. *See also* disk drive.

H

hard disk

A magnetically encoded disk that is rigid and cannot be removed from the disk drive. *See also* disk.

hard disk drive

A disk drive that writes and reads hard disks. *See also* disk drive.

hardware

The physical components of a computer system. *See also* software.

K

keyboard

A device that enables users to input data directly into the computer system.

L

local area network (LAN)

A group of clusters tied together so that members of the various clusters can share the resources of other clusters in the network.

local file system

A hard disk module (usually includes a floppy disk drive) that is directly attached to a workstation. A workstation with a local file system can run programs and access files without having to be attached to a server.

M

memory

A hardware or software component of a computer system that stores information for retrieval.

memory expansion

Circuitry that provides additional memory for the system; memory expansions are installed in the processor unit.

modem

A device that converts digital computer signals so that they can be transmitted using analog telephone lines.

module

A device that enhances a workstation by adding such capabilities as graphics processing, disk storage, tape backup facilities, networking, and so forth. Modules are attached to the right side of a processor unit or to another module.

monitor

A device equipped with a screen that acts as a visual interface to the computer system. Monitors allow you to supervise, control, and verify the operation of the computer system or the performance of a task.

mouse

A pointing device that allows you to position the cursor on the monitor screen.

N

network

One or more servers connected together to form a network of clusters.

O

operating system

Software that controls the general function of a workstation. Operating systems may also provide resources, such as data management, for the workstation. *See also* CTOS operating system.

P

parallel printer

A printer that receives and transmits data bits in parallel bursts of one or more bytes as opposed to serially (bit by bit). *See also* printer; serial printer.

parallel printer cable

A cable used to attach a parallel printer to the computer system.

peripheral

A device (such as a printer, monitor, or modem) that attaches to one of the external ports on the workstation.

port

See connector.

power code

A number that reflects the power consumption of a module or peripheral. These numbers are added to determine how many power supplies the workstation needs.

power supply

A device that connects the workstation to an ac receptacle. Power supplies convert the line voltage from the wall socket into the voltage needed by the workstation.

printer

A device that generates a printed copy of computer files, screen information, and so forth.

processor unit

The hardware component responsible for the basic control functions performed by the workstation. The processor unit contains the CPU, memory, and associated circuitry. *See also* central processor unit.

R

Random Access Memory (RAM)

A type of memory that allows both read and write operations. This type of memory is used to run applications programs and other types of nonpermanent software.

Read Only Memory (ROM)

A type of memory that allows only read operations. This type of memory stores programs that remain a permanent part of the system (for example, bootstrap routines).

reboot

To restart a workstation. *See also* boot.

receptacle

See connector.

reset

See reboot.

RS-232-C cable

An industry-standard cable commonly used to connect printers and modems to your computer system.

RS-422/485 cable

An industry-standard cable commonly used to connect workstations in a cluster.

S

SCSI (Small Computer System Interface) bus

A bus used for communication between modules and intelligent peripherals.

SCSI module

An individually housed module that expands system capabilities. SCSI modules utilize the SCSI bus to communicate with other SCSI modules in the workstation. *See also* module.

serial device

A device that sends or receives data bits one at a time. *See also* modem; serial printer.

serial printer

A printer that receives data bits one at a time. *See also* parallel printer; printer.

server

A workstation or shared resource processor™ designated as the controlling unit of a cluster. The server runs application programs and system services used by workstations in the cluster, supervises cluster access to attached peripherals, and provides individual resources (such as disk space) to each workstation in the cluster.

Single Inline Memory Module (SIMM)

A memory expansion whose RAM circuitry is mounted on a compact card.

software

Programs and procedures that control the operation of a computer system. *See also* hardware.

standalone workstation

A workstation, not attached to a cluster, that contains a local file system.

status code

A code that notifies a user of workstation status. Status codes are the main error reporting mechanism for the workstation.

system administrator

The person responsible for maintaining a computer system.

system services

Software programs (such as electronic mail) that are supported by the operating system and, in turn, support application programs.

T

tape cartridge

A cartridge that contains a reel of magnetic tape used to store data.

tape module

A device that writes and reads information on the surface of a magnetic tape.

TeleCluster

A clustering product that utilizes twisted-pair wires to connect cluster workstations through a TeleCluster hub.

token ring

The technological base for one type of local area network. *See also* local area network.

V

video display unit

See monitor.

W

wide area network (WAN)

A group of clusters tied together so that members of the various clusters can share the resources of other clusters in the network. WANs can transmit data over longer distances than LANs.

X

X-Bus

A system bus that connects various modules in the workstation.

X-Bus card

A card that enhances the processor unit by adding such capabilities as graphics processing. X-Bus cards are a space saving alternative to modules that provide like functions.

X-Bus module

An individually housed module that expands system capabilities and utilizes the X-Bus to communicate with the processor unit and other modules. *See also* module.

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